ENGINEERING ECONOMICS

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BOOK I

ELEMENTS OF INDUSTRIAL ORGANIZATION

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PREFACE
TO THE FIFTH EDITION

THERE is no kind of business activity in which a knowledge of economics will not prove valuable. The object of this book is to give a background of the movements and tendencies against which the individual firm operates and to which it must in the long run conform, however efficient its internal organization.

It is assumed that the engineering students of this book intend to become executives and that the reason they are studying is that they are determined to understand the admittedly complex but not mysterious problems which have so profound an effect on their own profession.

A primary object of this book is therefore to introduce the engineer to a study of the techniques that impinge on and affect his own technique and to give him a necessarily brief sketch of the economic system—the system of production and distribution—which will help him not only to see how his own technique fits into the general system, but also to realize his responsibility in the efficient working of this system. Even though the conclusions reached by economic studies are not necessarily of direct use to an individual business they will give the student a training in judgment which is bound to be of practical value in life.

A secondary object is to provide in convenient form an introduction to the reading required for Section A (Fundamentals of Industrial Administration) of the examination of the Institution of Mechanical Engineers, for the Graduate examination of the Institution of Production Engineers, and for the optional subject in the syllabus for graduate membership of the Institution of Electrical Engineers.

The ground that has to be covered is, however, so extensive that in several branches of study only the briefest

treatment is practicable. The student who wishes to go further than the minimum requirements for examination purposes is recommended to pursue his reading in the books mentioned at the end of each chapter. These are arranged in two groups: (*a*) easier works which all students should attempt to read, and (*b*) more advanced works. The lists are not intended to be exhaustive; they are merely a guide to the reading which a student, not intending to become a specialist in the various subjects, might reasonably be expected to do.

This Fifth Edition has been completely revised. Chapters I and II, on Elements of Economics and Money, Banking and Exchange, have been entirely rewritten, and a new chapter on the Trade Cycle has been introduced. Chapters III and V, on Resources and Business Organization, have also been reconstructed and much new matter added. The remaining chapters have all undergone considerable revision and rearrangement.

T. H. BURNHAM.
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BOOK I

ELEMENTS OF INDUSTRIAL ORGANIZATION

CHAPTER I

ELEMENTS OF ECONOMICS

ENGINEERS have a special interest in economics. They are engaged in improving and increasing production, in reducing human effort and in increasing wealth, in making the world a more comfortable place in which to live and in increasing well-being. This at least is what they should be doing, but their efforts are all too frequently nullified or misapplied: industries obtain Government assistance to buy up and close down shipyards and to destroy cotton spindles; machinery lies idle and men who should benefit from increased production are unemployed. There is even a greater tragedy: machinery and men are utilized to build up giant war machines in preparation for greater and more effective destruction. It was said of President Roosevelt, when in 1933 he began his New Deal to raise the United States from depression by keeping production down in order to raise the prices of the remaining output, that there was nothing he did that could not have been done much better by an earthquake! The criticism may have been a little unkind, but it is a startling reflection on our civilization that with poverty still widespread, Governments appear far more concerned in the destruction of wealth and productive power, or in the making of machines of destruction, than in engaging in useful activity.

Mechanical engineering in one form or another has been the most potent force in changing this country from being almost entirely agricultural to being mainly industrial, with a very large increase in population and wealth. In spite of the progress achieved by the engineer, affecting the whole community, decisions in social life have never been entrusted to him; they have been the prerogative of the financier and politician. It has been on the whole his

own fault, as the engineer, either through absorbing interest in his work or lack of vision, has not laid any urgent claim to his qualifications and right to a decisive voice in industrial control and social betterment.

Neither engineer nor scientist is playing his full part in society if he confines his outlook to technical problems and pays no attention to the use or the misuse or the lack of use of the productive powers he is building up. If production is intended for the well-being of the human race the engineer should do his part to ensure that the intention is carried out. It is a mistake to suggest that this is a matter for a different kind of specialist. All technical specialists have a duty to see that the joint product of their labour is utilized to the fullest efficiency and the efficiency which the engineer demands in his own technique he must demand throughout the whole factory and throughout the whole economic system, remembering always that the purpose of efficient production is the satisfaction of wants, the happiness of the human race, the greatest good of the greatest number. What is added to the sum total of human happiness by running a factory at its maximum efficiency in machine output and labour utilization, if outside that factory machines and men are idle? Of what use is it to invent machinery to lighten effort and fatigue if the result is unemployment and misery to others? Every engineer should be interested in productive efficiency and this should mean not only the productive efficiency of a unit, of a single factory, but of the whole resources available to mankind. The aim of industry should be to serve the best interests of society. All technical specialists must therefore be economists and politicians, for this means that they must interest themselves in the organization and conduct of the society to which they are devoting their labour. Production does not end till use begins: the efficient working of the system by which wants are satisfied—and this should be the aim of production—is the responsibility of every citizen. It is not a responsibility to be passed on to some special

section of the community. True, specialist technicians are required in the administration of Government services, but this has nothing to do with the fact that the smooth working of the whole machinery for the satisfaction of wants is the responsibility of every technician, no matter in what department of the national productive mechanism he may be working. The engineer in charge of the turbines of an ocean liner is concerned not only with the efficiency of his propelling machinery, but also with that of the steering machinery. When the order "Full steam ahead" is given it is as well to feel confident of the direction in which one is going.

A main principle of industrial organization is specialization, but this does not bar any worker from insisting that his own efficiency should not be nullified by inefficiencies in other departments or in the general administration of the enterprise. The whole organization of society is as much the concern of the engineer as is the technique of production. It is a mistake for the engineer to concentrate only on his own technique and to forget that unemployment, poverty, war, are defying his efforts to make a better world. In fact he is not allowed to forget these unpleasant matters and the second "Great War" has already brought home to every engineer how national resources may be concentrated on purely destructive ends. It is important therefore to realize that these matters are as much the business of the engineer as is the job he is paid to do. Nothing is more responsible for the toleration of inefficiency in social and economic life than the apathy of the ordinary citizen.

Meaning of Economics

Economics deals with what everyone is doing every day in ordinary life, that is, getting a living. It is a human study, a branch of the social sciences, a study of business activities with the emphasis on their social aspect. It is concerned with the organization of society for the production and distribution of wealth, and although it deals with

what is and not with what ought to be, it is not a static study but a dynamic study of business life. Productive society does not stand still, neither in its techniques nor in its human relationships. The water-wheel gives place to the steam-engine and the engine to the electric motor; primitive communal society gives place to feudalism and feudalism to capitalism; competitive capitalism gives place to monopoly capitalism; *laissez-faire* gives place to planning; in one country capitalism has given place to socialism. There is no finality and no greater mistake than to imagine that the techniques and the human relationships of to-day are fixed for all time. So when we say that economics is a study of what is and not of what ought to be, of fact and not of ethics, we must remember that what is is always changing and becoming something else.

Just as there are physical laws governing the behaviour of matter so there are economic laws governing the behaviour of society. Now a scientific law is a statement to the effect that every cause tends to produce some definite result and does produce that result if nothing happens to prevent it. Economics is undoubtedly a science as it is concerned with causation and sequence. But since man is possessed of volitional initiative it may be asked whether we can make any generalizations whatever about human actions; yet unless we can generalize our statements we cannot formulate a science of society. Actually whatever irrationality appears in the behaviour of the isolated individual, that irrationality disappears when the individual is studied as a member of a group. For example, it is possible to estimate the wages that must be offered to produce a supply of labour of a given grade. The habits of almost every member of a class are the same as regards working and spending and the same actions may be expected under certain conditions. On the other hand, a man's motives and character may be modified by his economic status. Economic generalizations must, therefore, only be taken

as observed uniformities in human actions modifiable by environment.

In the dynamic organism of productive society the "economic laws" which govern it are only tendencies; the economic laws of the feudal system no longer operated in the *laissez-faire* age of the nineteenth century (e.g. the "just" price became the "competitive" price). The *laissez-faire* system was dominated by the idea of the "free market"—a place where buyers and sellers came together to deal on terms of perfect equality—and market price was supposed to be the result of free dealing between the suppliers and requirers of materials and labour. So far as labour was concerned the "free" market was a myth: the buyer of labour power was in a superior bargaining position to the seller, and the more unemployed there were, the more competition to sell labour, the less fair the "bargaining." "It is remarkable to observe," wrote the writer of a nineteenth-century tract of the S.P.C.K., "how through the beneficent dispensation of Providence the efforts of every man to improve his own position in competition with his fellows result in the greatest good for all." It would indeed have been remarkable to observe anything of the kind, but in actual fact it proved necessary to supplement the "beneficent dispensation of Providence" with a mass of industrial legislation, contrary to the spirit of *laissez-faire,* which implies a leaving free of the economic processes to "natural laws."

Laissez-faire knows no plan, the system being directed instead by the indices of prices and profits in the "free" market, which influence the decisions of business leaders. "Profit" is the dominant economic motive in capitalist society—"the mainspring of private enterprise"—but it does not follow that this is the strongest motive under all forms of economic organization.

The laws of *laissez-faire* are ceasing more and more to apply to the controlled economic systems of to-day. *Laissez-faire* implies freedom to producers to operate without

restrictions other than certain property rights imposed as a measure of social expediency, but to-day in this country the tendency is towards self-imposed industrial control with Government assistance, while different degrees of centralized planning are found in Germany and Russia, and some other countries. The war has brought vast extensions of Government control in the economic sphere in all countries concerned, much of which will undoubtedly be permanent.

PRODUCTION

Economics is concerned with the production and distribution of wealth. The term *production* includes not only producing in the technical sense, but also transport and selling services, in short all the processes which increase the value of a product. The process of production continues till final consumption (use) begins; the cost of setting up a machine in a factory is part of the cost of production of the machine to the factory owner.

Wealth, which is the aim of production, is anything that has exchange value. All goods which satisfy human wants are not necessarily wealth, as they may be unlimited in quantity or incapable of being appropriated or not transferable, e.g. air and rain (but water stored in a reservoir is wealth). Shares, copyrights and patent rights constitute wealth just as much as buildings, machinery and tools. Wealth may be classified as material or personal; personal wealth consisting of the energies and faculties which make people industrially efficient, as well as business connections and goodwill. Things which are collective property, roads, bridges, waterworks, public parks and buildings, etc., belonging to the community in general, constitute *social wealth*. The *national wealth* includes both individual and collective property.

Wealth must be distinguished from *well-being*, which indicates the satisfaction derived from wealth. A country may have a great deal of wealth, but a maldistribution of

incomes may lead to a very indifferent state of general well-being, while a poorer country with a more equitable distribution of wealth may have a greater degree of well-being.

CAPITAL

Wealth may be immediately consumable, constituting *income*, or productive, that is to say, used for making other consumable wealth, constituting *capital*. Capital, then, is wealth which is used for the purpose of producing further wealth. While all capital is wealth, not all wealth is capital.

The *capitalist system* is the name given to our present economic system on account of two characteristics which distinguish it from other economic systems. First, the high proportion of capital used in production in relation to direct labour. This feature, highly mechanized production, is shared by all modern economic systems. Secondly, the separation of the ownership of the means of production from the labour employed in production. In feudal agricultural communities *land*[1] was the main form of capital, and when this was limited and could be appropriated by a small section of the population, the remainder could utilize their labour only by hiring themselves out to the owners of land, who demanded a part of the product of labour in return. In modern industrial society the machines and factories necessary for production are privately owned, while production is collective, involving the association of large numbers of workers of all grades from unskilled labourers to highly skilled administrators. These, however, possess only personal capital (strength or skill) and not the material capital with which they work.

The term *capitalist* does not refer to every owner of productive capital, but only to the owners of productive capital

[1] Although land—including raw materials in their natural state—is often distinguished from capital as being a "free gift of nature," while capital has been produced with the aid of labour, yet so far as its economic function in production is concerned land in no way differs from capital.

who employ labour other than, or in addition to, their own to work on the capital. That is, it refers to a productive relationship rather than to the ownership of capital. The possession of a home, or of a box of tools, or of a barrow, does not bring the owner of such "capital" into the category of capitalist.

The provision of capital and the provision of labour are functions. Society does not consist of two watertight classes of capitalists and workers, since many producers perform both functions, but it is always possible to separate in a capitalist his function of owning capital from, say, his function of managing a business, which is a labour function. The capitalist who combines both functions is an *entrepreneur* (French *entreprendre:* to undertake) and the name is also given to persons who, though not possessing capital of their own, hire both capital and labour for the establishment of an enterprise. The capitalist who merely owns capital from which he derives an income without using his labour is a *rentier* (French *rente:* yearly income, cf. rent).

The ownership of capital is not widespread. Of the total number of persons over 25 who die each year 70 per cent leave under £100 in all forms of property; of those who leave more than £100, 63 per cent leave under £1000 and the value of their estates is only 7 per cent of the total value of all taxed estates; under 7 per cent leave more than £10,000 but the value of their estates is 66 per cent of the total.[1]

Capital may be described by different terms, according to the way it is used. Thus capital may be *instrumental, fixed* or *sunk*, indicating things of durable form serving the same purpose continuously and aiding labour in production, such as plant, railways, docks. *Specialized* capital is suited only for a single purpose, while non-specialized capital can be adapted to more than one industry. *Circulating* capital fulfils the whole of its function in a single use (cash,

[1] Based on 1934–5 figures.

debtors, stock, constantly flowing through a business), and *floating* or *liquid* capital (cash and debtors) is available for conversion into any other form. *Consumption* capital consists of goods in a form to satisfy wants directly, including things such as houses and clothes which consumers use while producing (sometimes known as *auxiliary* capital). *Social* capital is that of society as a whole not privately owned.

Like other forms of wealth, capital is the result of the application of labour to the "free gifts of nature." While, however, consumers' goods give immediate satisfaction, capital goods, which will later produce consumers' goods, give no immediate satisfaction and involve a preference for future benefits as against present benefits. The act of withholding current consumption in order to enjoy deferred consumption is *saving*. This does not imply a sacrifice except in the sense of a temporary postponement of satisfaction, since the object of the saving for building up capital is to be able to enjoy greater satisfaction later than would be enjoyed by present consumption. The degree of temporary sacrifice involved in the allocation of a given proportion of productive power to making capital goods instead of consumption goods, varies also according to the total output of all goods. A country with a low output per head makes a greater "sacrifice" in saving, say, 10 per cent of the national income than a country with a much higher output per head, since in the latter case the inhabitants have satisfied more immediate wants before beginning to save. What is true of countries is true of the individuals who make up the countries.[1]

Saving has two aspects: a negative one, the mere non-consumption of "income," and a positive one, the *investment* of income. Investment means, in effect, that of a

[1] Incidentally it may be noted that much of the trading capital that was built up in this country before the Industrial Revolution did not involve even temporary sacrifice: it was the result of piratical raids on the treasure ships of the "Spanish Main," of a thriving slave trade and of dubious trading methods in India!

person's total output part has gone into the production of capital goods.

SPECIALIZATION

Modern production requires a combination of four factors: land (including raw materials), capital, labour, and organization. Organization is, of course, administrative labour and, if we consider land as a form of capital (wealth used to produce further wealth), then there are two agents, capital and labour. Production is conducted on two main principles: the *specialization* of labour (one man, one job) and the *integration* of processes (the linking up of the specialized processes).

Localization of Industries. Specialization need not be confined to labour. Capital may be specialized, while industries may specialize on a geographical basis. Geographical specialization is less important than formerly, but areas such as Lancashire, the West Riding, South Wales, the Potteries and Sheffield, are not only the home of specialized industries, but are basically dependent on those industries.

The main reasons governing the *localization* of an industry are access to raw materials, power, markets and labour. The first two are particularly important for the heavy industries but their relative importance may change. For instance, the use of electricity has helped the establishment of industries away from the traditional areas, while fuel economies now make it cheaper to carry coal to the Northants iron deposits than to bring the ore to the coal for smelting. Nearness to markets is an important factor in the light industries making relatively costly products which would pay heavy rail charges, while in spite of the mobility of labour firms like to be near existing supplies.

Capital is more easily provided in a developed than in an undeveloped country, hence the latter must enlist the aid of modern industrialized countries. Artificial assistance, such as tariffs, may be responsible for the existence of an otherwise uneconomic industry: for example, British wheat

and beet cultivation, or the establishment of steel industries in the Dominions (often subsidiaries of British firms which set up factories inside the tariff barrier). *Inertia* may keep an industry where it is and subsidiary industries may spring up in the locality: the home of the cotton industry, for example, is also the home of the textile machinery industry; but the damp atmosphere of Lancashire is no longer essential to cotton processing.

The *southward drift* of industry (meaning the establishment of new industries in the south rather than the transfer of existing industries) may be partly accounted for by the use of electric power, the replacement of male by female labour—the textile industries provide alternative female employment in the north—the fact that labour is much less organized in the south than in the north and some firms object to unionization, nearness to the London market and, a quite important factor, the simple preference of employers for living in the south (e.g. this last is the sole reason for the localization of the Morris motor works, the founder being born at Oxford). The decline of industry in the north and the haphazard localization of the new industries has brought with it numerous evils. The arterial roads, designed to provide speedy outlets from congested London, have become lined with factories and housing estates. New essential services—water, power, housing, sanitation, education—have had to be provided for the new centres of population, while in the north the capital sunk in these services has become partially disused and whole regions have become "distressed." In the ten years 1928–37 one quarter of a million people emigrated from Wales.

The report of a Government Commission on the Localization of Industry led *The Times* to castigate the Board of Trade, which "propounded in a mid-Victorian voice" a "policy of do-nothing, which is not only outmoded but is utterly unsuited to the present day," and which, incidentally, is contrary to the policy of active intervention in industry which the Government has pursued in other fields.

Just as localization is breaking down in this country so internationally specialization is beginning to disappear, and though countries still have an industrial or a primary producing bias, yet their occupations tend to become more balanced.

Division of Labour. Labour is specialized, both among operatives and in the administrative grades. In the latter sphere production, sales, finance, etc., may be placed under different managers, and part of the science of management is to ensure that perfect contact is maintained between the different functions and that speed of decision is not hampered. The degree of specialization possible is limited by the size of the business: it begins among the operatives and rises to the management. Administrative specialization is certainly not as fully developed as is possible, and the subject is pursued in the chapter on the Management Function (Book II).

Among the advantages of the division of labour may be mentioned the time saved in training; the economy of capital (each specialized machine is in constant use by a specialized worker); the higher speed and skill attainable. Monotony may be countered by shorter hours, which greater production makes possible, and the opportunity to develop other interests. With the simplification of operations it is also desirable, from the worker's point of view, for there to be frequent changes of task, even though this may raise labour costs.

Size of the Business Unit

Modern production tends to an increase in the size of the productive unit, the limitations to which are the size of the market and the difficulty of controlling the "industrial giant." The latter difficulty can be largely overcome by scientific organization, involving the ruthless subdivision of the management function. The advantages of the large-scale concern include those resulting from the specialization of labour; increased mechanization (multiplication and

simplification of processes); economy in bulk purchases of raw materials; ample resources for serious research and the lower unit costs due to high output.

Costs are made up of direct or *prime costs* (including labour, fuel and raw materials) and indirect costs or *oncosts* (overhead expenses). The *fixed overheads* are those expenses which persist whatever the scale of operations, such as administrative expenses, selling and advertising, light and heat, etc., and these are reduced per unit the larger the number of units produced. The most economical use of capital involves its continuous employment and as the scale of output increases direct costs rise proportionately, but oncost increases much more slowly, so that the cost of each additional unit of output is reduced. This is the law of diminishing costs or *increasing returns* (profits): every additional unit of productive power gives a more than proportionate return. It has its converse in the law of *diminishing returns* which applies when every additional unit of productive power gives a less than proportionate return even though the *total* output continues to increase. Beyond a certain point this applies in agriculture, though such things as deeper ploughing, better fertilization, etc., may constantly push forward the point at which decline begins. It may also apply in industry when men and machinery are driven at too great a speed in an attempt to get a larger output, and the deterioration of the machinery and the exhaustion of the men lead to a fall in the rate of increase of output. It is well known, for example, that overtime labour is dear in a double sense; not only is the hourly rate higher, but the hourly output is lower. An increasing number of firms are finding that the five-day week (with a corresponding reduction in hours worked) actually leads to an increased weekly output. The introduction of rest-periods has the same effect.

Integration

Integration is the corollary of specialization. First the

processes are split up, then they are linked together either for reasons of technical efficiency or in order to exercise monopoly control. Integration may be either *vertical* or *horizontal*. Vertical integration is the linking up of successive stages in production as is illustrated below—

THE VERTICAL INTEGRATION OF PROCESSES

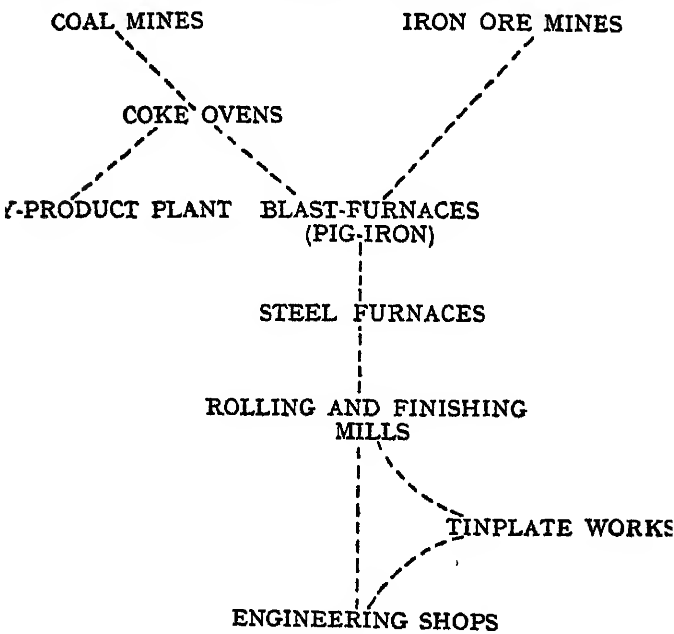

FIG. 1

The iron and steel industry lends itself best to such integration, of which perhaps the most extreme example is that of the United Steel Corporation (Pittsburg, U.S.A.), which not only controls all the processes noted above but goes on to make and operate its own transport by land and water and owns the property on which its employees live and the shops and city services which supply them.

The reasons for such integration are, first, technical

(molten pig-iron to steel furnaces without cooling) and, secondly, economic (to secure markets for the products of prime industries and sources of raw material for secondary industries).

Horizontal integration consists of the linking up of similar enterprises, for instance, a chain of coal mines, power stations, steel works or multiple stores, with the essential objective of establishing a monopoly, although economy and increased efficiency may likewise result. A combination of horizontal with vertical integration is found in the operation of many different industries connected only in their single raw material origin or in their utilization of the same plant. Coal-tar, for example, can be used in the production of scents, medicines, dyestuffs and explosives,[1] while the same machinery can be adapted to make agricultural machinery in peace-time or shells in war-time,[2] or parts of gramophones and wireless sets in winter and bicycles in summer.[3]

The *disintegration* of processes may lead to economies where several firms use standard units in the manufacture of their products. It is more economical for a speciality firm to make the unit for all the users than for the latter to aim at self-sufficiency. An example is seen in the manufacture of motor car bodies and wheels.

Rationalization. Rationalization is the logical development of combination and involves the conscious planning of industry and the elimination of waste in materials, human effort and distribution. It is often accompanied by horizontal integration and the weeding-out and closing down of the less efficient units absorbed, the concentration of output on the most efficient units and the re-equipment of productive units with the most up-to-date plant. Rationalization may take place both inside a firm and inside an industry, and becomes of special significance in a depression when profits are low. Under private enterprise it almost

[1] I.C.I. [2] Ransome & Rapier.
[3] H.M.V.—Rudge-Whitworth.

inevitably involves unemployment, but this is not an argument against rationalization. It indicates the necessity for securing alternative employment for the displaced labour or compensation as generous as is provided for the owners of scrapped plant. The economies of rationalization should be passed on in benefits to the whole community.

Monopoly

The growth of large-scale integrated concerns has led to conditions of *monopoly* in many branches of production. Monopoly is, in fact, more widespread than is commonly imagined, for a monopoly may be effective without being complete and without involving unified control. A *cartel* or selling organization serving an industry, fixing prices and sharing orders amongst its members; a price-ring, a group of firms which have agreed on a price policy; these and trade agreements constitute monopoly from the consumers' point of view by eliminating price competition. Distilling, soap, sewing cotton, flour, tobacco and cement are practically under monopoly control, while iron and steel, engineering, electrical engineering and electric lamp manufacture, have all to a very considerable extent eliminated competition within their ranks. All business men endeavour to secure a monopoly, and the cry for rationalization is often a disguise for the monopoly which is being sought.

Monopoly may give all the advantages of large-scale production, with price reductions to the public, but on the other hand inefficiency and high prices may be the only result. Especially is this a danger where cartels and price-rings are formed, sometimes with statutory powers to control prices and to coerce recalcitrant minorities, but without effective powers of rationalization (e.g. coal and agriculture). Steel users, for instance, have raised loud protests against the monopolistic tendencies of home steel producers, whose position is reinforced by import restrictions and membership of the continental steel cartel, and one prominent

motor-car manufacturer[1] threatened at one time to set up his own steel works after the American practice. The elimination of competition removes one of the main advantages claimed for private enterprise so that there is a good case for placing monopolies under public control. Particularly is this so since in this new industrial age it is being found that the problems of industry cannot be isolated from social problems. It is being appreciated that industry should work for the service of the community and be controlled and administered for the benefit of society as a whole.

Instead, therefore, of being characterized by disorderly production industry should have a planned direction. Programmes of production must be based on collective estimates. There are already many instances of centralized and co-ordinated management of industries but regulative powers amounting to monopoly should be granted only in return for acceptance of social responsibilities and the running of the industry in the interests of the nation as a whole. Control should be vested only in men of vigour, competence and honesty—not in a restrictive bureaucracy.

Markets and Exchange

A market is any organization for the bringing together of buyers and sellers. In some, buyers and sellers actually meet and handle the commodity, in others samples of the goods only are present, in yet others sale is by description. Some markets are local (garden produce), others are world-wide (copper) with dealers and stocks, no matter where placed, in the same effective market. A perfect market is very wide, deals in a standardized commodity, with buyers and sellers equally well-informed and with bargaining on a basis of equality. Markets may be *spot*—goods dealt in for immediate delivery—or *futures*—a present contract for future delivery. Spot prices will be influenced by immediate demand and supply, while futures prices will depend on

[1] Austin, 1937.

estimates of the spot prices at the future date. *Option* deals give the right to exercise an option to buy or to withdraw if the price is unfavourable when the contract is due for completion, a small commission being paid for the privilege.

The exchanges of London are world markets for metals, wool, rubber, cereals, tropical commodities, etc., and dealings on them are as much speculative as genuine. Speculation, however, may, provided it is not carried to such excess that prices become erratic or an artificial shortage is engineered, assist true dealers, since the speculators "make a market": that is, under normal conditions they will always deal and take the responsibility of selling what they have bought or of buying in what they have sold. Speculators, in effect, are experts in taking risks which persons outside the market would not care to take. A special example of these risks is seen in *hedging*. A manufacturer requiring raw materials in, say, three months' time, may wish to buy immediately for future delivery. Before manufacture, however, the price may move and an unexpected profit or loss be made. To guard against either, the genuine purchase is "married" to a speculative sale to a dealer also for future delivery. When the due date falls the manufacturer pays the dealer, or receives from him, the difference between the current "spot" price and the price of the "future," this amount compensating the gain or loss on the genuine purchase due to any intermediate change in price.

The Stock Exchange

This is the market for already invested capital in the form of securities, consisting of stocks, shares and bonds given to those who put their money into companies or into loans floated by the Government, municipalities or other public bodies. The Stock Exchange is the necessary accompaniment of the joint-stock company, since an investor who has put his money into a joint-stock enterprise cannot withdraw it, but can only transfer his investment to

someone else. The Stock Exchange is the market for such transfers, without which investors would be reluctant to place their savings in industries over which they had no control.

The members of the Stock Exchange are *jobbers*, who deal on their own account, and *brokers*, who act as agents (on commission) between the public and jobbers. Since the Exchange is a "perfect market" and since deals are mainly for settlement at the end of the fortnightly "Accounts," its chief activity is speculation, which has been defined as buying what you do not want from someone who has not got it! The speculative buyer is a "bull" who hopes to sell out at a higher price, while sellers who are aiming at forcing prices down in order to buy in cheaply are "bears."

Value and Price

The market is the focal point of the "free" capitalist system, for in the market producers and consumers meet and price is determined. Price is exchange value expressed in terms of money; it is the index which production follows, for its movements indicate the relationship between supply and demand. Absolute price levels do not mean anything, nor can the value of a commodity be considered apart from other commodities. Value is a relative term and relative prices are significant since they enable exchange values to be compared. Movements in absolute price levels too are significant, since they indicate a disequilibrium between demand and supply.

Behind the demand for a commodity is its *utility* (value in use). Commodities are desired for their usefulness, yet, as was seen earlier, a commodity may possess utility without possessing exchange value, e.g. air—though to possess exchange value a commodity must have utility. Utility, moreover, varies from person to person since not everyone gets the same satisfaction from an article, but in a market there can be at one time only one exchange value, one price, for a commodity. The link between utility and value is as

follows: every addition to a person's stock of a commodity possesses less and less utility, e.g. if one has only one suit its utility is enormous; a second suit is not so precious; a third still less, till ultimately one has a surfeit of suits and additions might be considered a positive nuisance (disutilities)! This is the *law of diminishing utility:* the more one has of a thing, the less one wants a little more of it. Now the sum of the utilities derived from all the suits is the *total utility*, while the utility derived from the last suit one feels induced to buy *at current prices* is utility at the margin of demand, *marginal utility*. Now assuming one has laid out one's income wisely it follows that the utility of the articles one has bought is greater than that of other articles one could have bought at the same price. The prices one has paid therefore measure the relative utilities of the last one of each kind of article bought, that is, the relative marginal utilities.

Price, then, measures marginal utility; but exchange value is determined not only by marginal utility to consumers on the demand side, but also by marginal utility to producers on the supply side, that is, by the marginal cost of production (the cost of producing the last or most costly unit). Supply price, in fact, must be governed by the costs of the least efficient or highest cost producer whose output is required, since if his costs were not met then he could not afford to produce, supply would drop and prices would rise till his costs were met.

In the long run, therefore, price must be determined by the cost of production, which includes normal profits. It cannot be below without causing the ultimate bankruptcy of the highest cost producers (though they may survive a long time at a loss), while if it rises above then abnormal profits will be made, additional producers will be attracted and prices will drop. In the short run the demand factor is most important, a sharp rise in demand tending to make prices rise above production cost and a sharp fall sending prices below. The following diagram shows how price is

fixed at the point of equilibrium between supply and demand. The demand curve illustrates the *extension* of demand as price falls, while the other curves illustrate supply under conditions of increasing (a and a¹), constant (b), and decreasing (c) returns as production is increased.

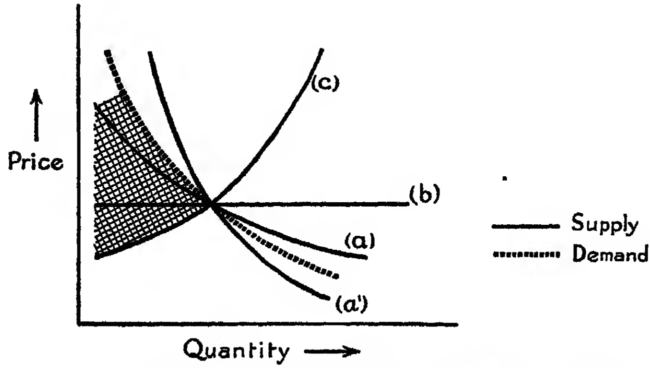

FIG. 2. DIAGRAM SHOWING SUPPLY AND DEMAND CURVES

The shaded area indicates the difference between what consumers would be prepared to pay and what supply costs actually are; the gap represents a "consumers' surplus" which a monopolist may appropriate. Prices are not generally or under present conditions usually determined by the free forces of supply and demand. Before the advent of price control by the Government as a war measure, price determinations were generally due to the formation of associations in practically every trade to constitute representative bodies in negotiation with the Import Duties Advisory Committee, the latter controlling tariffs on competitive imports. In general prices were fixed on the principle of what the traffic would bear. Monopoly price may be anything above cost of production up to demand price; the monopolist will set his price at a point along the demand schedule that gives him the maximum profit. This is not necessarily a very high price in relation to the cost of production, but in the case of necessities, where

consumers' surplus is high, monopolies are potentially dangerous, since they may choose to restrict supply and to keep prices high.

The demand for necessities is relatively *inelastic*: a change in price produces a less than proportionate change in demand, hence prices can be raised and profits increased to the detriment of the consumer. Where demand is *elastic*, as for luxuries, an increase in price will at once cause it to contract and the monopolist is less likely to benefit from a high price policy. Substitutes may also check an unlimited rise in price, since beyond a certain price demand may be switched over to the substitute commodity.

In the case of *joint products* (e.g. coke and coal-gas, meat and hides) the cost of producing both items together is the only cost the producer considers, so that one of the products may be sold at a price that merely covers the direct cost of putting it on the market, while the other product may bear the overheads of the business and yield the profit.

The *labour theory* of value has a different purpose from the marginal utility theory outlined above, which indicates why and how prices move. The labour theory is not essentially an exchange theory but a theory of distribution, arguing that since only labour produces value (capital itself having been produced by labour) any rewards to other "agents" of production, e.g. interest, must be taken from labour.[1]

Distribution

The term "distribution" refers to the sharing out of the net national income (total output less depreciation) among the owners of the various factors responsible for production: labour (including administration), capital and land.

Inanimate things—land and capital by themselves—cannot produce anything. Labour, working on raw materials, is alone capable of producing wealth, but, since labour

[1] Marx: "Das Kapital." Vol. I. Eden and Cedar Paul's translation.

can produce more wealth than is necessary for its own sustenance and reproduction, there is a surplus which may be distributed either as additional wages or otherwise. This surplus could be (*a*) used to raise the standard of living above subsistence level, (*b*) saved, in order to accumulate capital to assist further production, (*c*) retained by the owners of the essential aids to production, land and capital. Under the system of private enterprise and private investment many people contend that the surplus goes mainly to the owners of land and capital, who in turn save and reinvest a portion.

Rent is the share of the national income that goes to the owners of "land," the "free" but appropriated gifts of nature. Mineral royalties are a form of rent. The amount of "economic rent" (not necessarily the same as money rent) is determined by the richness of the land or mine, since the greater the value that a given amount of labour can produce, the greater the surplus from which rent can be paid. Economic rent is in fact the difference between the yield of land and the cost of producing that yield. It does not represent a reward for any service performed, but is simply a charge made by the possessors of land to producers who, of course, cannot work without land. Money rent actually paid may not coincide with economic rent, since the disposal of the available surplus is a matter for bargaining between the parties concerned.

Interest and *profit* are the shares of the national income that go to the owners of capital. Interest is sometimes considered as a fixed payment while profits are variable, but economically there is no difference between them. Profit is sometimes considered as the return to the "entrepreneur"—the person responsible for initiating production as distinguished from the "rentier" who is passive and merely lends capital. But for the sake of clarity it is important to distinguish between the two functions of the entrepreneur: (*a*) his ownership of capital, (*b*) his management of capital. His so-called profit is partly a true profit—

payment for ownership—partly the wages of management. Such wages are part of the general reward to labour of which administrative labour is but the highest grade. The small shopkeeper's "profit" is often only the reward for labour.

The national income is distributed either in payment for work or in payment for ownership: it goes either to labour or to capital. Interest is sometimes considered as a reward for saving. Under private enterprise saving is left to individual initiative: some persons save and some do not, the main determining factor being the size of the individual's income and the balance available after providing for all necessities. The "sacrifice" involved in saving, the degree of which varies according to a person's income and spending habits, has, however, no market value: if it did it would be a delicate problem to determine how much effort in saving equalled one hour's effort in working. If a person saves in a bank deposit account he receives ½ per cent on his capital, if in a successful business perhaps 10 per cent, if in an unsuccessful business, nothing! The interest received depends then on the amount of surplus produced by the industry in which the investment is made and is received by virtue of the ownership of capital and not by virtue of any possible saving "sacrifice."

Profit is sometimes considered as a reward for risk: but if that were so, over all industry in the long run profit would not exist, since gains would be cancelled out by losses. This, however, does not happen. Nevertheless the risk factor does govern the differential returns between different businesses, capital in a risky business demanding a higher payment than in a safe business. Over all business in the long run, profit is simply a payment demanded by owners of capital from those who use the capital for production. If such payment were not made there would be no point in the private ownership of capital. Variations in rates of interest and profit reflect variations in the size of the surplus produced by different industries and indicate the direction

in which new capital needs to be invested. If profits are high in certain industries that indicates high surplus production relative to labour costs, so that capital is attracted into such industries, expanding production and lowering price. Investment will not take place in industries where the rate of profit is falling or is very low. The "gilt-edged" rate of interest is that rate which, risk factors apart, must be paid to induce the owners of capital to invest it rather than to hoard it.

Wages. The proportion of profit (including in the term interest and rent) in the distribution of the national income is some one-third and its amount is governed by the productivity of labour. The more productive labour is, the greater the surplus out of which profit can be taken. The share of wages depends (*a*) on the conventional (see p. 31) minimum for subsistence and (*b*) on any excess over this that can be obtained from the surplus. Wages can only increase at the expense of profits unless total output is increasing. The interests of labour are therefore the same as those of capital in the sense that both can gain from an increase in output, but opposed inasmuch as labour and capital seek to increase their respective shares of the surplus. The function of trade unions is to increase the bargaining power of labour and so to gain a greater share of the surplus over subsistence levels.

Under private enterprise the return to capital must not fall unduly low or the owners of capital will withhold it from production: capital "strikes" have in fact resulted in the U.S.A. from President Roosevelt's social legislation and in France under the Front Populaire Government, 1936–7, when capital thought that the State was unduly interfering in industry and raising costs. The power of trade unions to raise wages is limited by their power to increase their share of the surplus without reducing the whole surplus. Less capital will be used and less new investment will take place when, in a time of declining output, wages are kept up and the return to capital is reduced.

Labour's loss in unemployment resulting from the unprofitability of industry is only partly compensated through insurance or State relief.

The following table shows how labour and capital fared over the trade cycle 1929–37—

	(1) Profits	(2) Wage Rates	(3) Volume of Employment	(4) Volume of Wages $\frac{(2) \times (3)}{100}$
1929 .	100	100	100	100
1930 .	82	99	94	93
1931 .	61	98	88	86
1932 .	59	96	87	83
1933 .	68	95	90	85
1934 .	80	95	93	88
1935 .	91	96	94	90
1936 .	106	98	97	95
1937 .	118	102	99	101

Wage Theories

(*a*) *Subsistence Theory* and *Iron or Brazen Law*: that workers would always breed and increase their numbers up to the limit of subsistence, and therefore any improvement in the standard of living was impossible since it would result in a rise in the birth-rate and a consequent fall in the standard. Only persons in receipt of wages were supposed to breed in this fashion for there was no accompanying subsistence theory of profits! In fact the tendency to breed to the limit of subsistence is the result of poverty and not its basic cause, as India and China show. The more economically developed a people the less do they tend to multiply indiscriminately. The theory ignored the popular desire for improved living standards and underestimated the productive powers of industry, which enabled output to rise more rapidly than population.

(*b*) *Wage Fund Theory*: that the share of the output

available for the payment of wages was fixed and therefore any increase in wages for one group of wage-earners meant a reduction for other groups. The theory ignored the fact that total output could increase and that wage-earners might be able to benefit at the expense of capital.

(c) *Productivity* or *Marginal Productivity Theory:* that additional labour will be employed till the last addition to the total value of the product is only just covered by the wages paid to the marginal or the last worker taken on, without leaving any profit. As, in any grade of labour, wages are all equal, the wage paid to the last person employed will be the wage paid to all. This is not really an explanation of wage rates since it merely tells us that when wages are paid on a time basis additional workers will be taken on till the productivity of the marginal worker is equal to the rate paid, but it does not explain what governs the rate paid.

Mechanization, Wages and Welfare

Mechanization, by leading to increased output per operative, should lead to greater well-being. When the worker is his own employer this is so, but when the worker is employed by an owner of capital it does not follow that greater productivity will be accompanied by higher wages. Mechanization, after all, is introduced by the owners of capital for the purpose of increasing profits: it merely increases the surplus available after satisfying the minimum needs of the worker and it will be a matter of hard bargaining before the worker receives part of this surplus. It can be said, however, that mechanization makes higher wages *possible*.

As for welfare, under conditions of rising prosperity mechanization leads to higher total output, but when demand is falling mechanization merely leads to a reduction in the amount of labour used and a stabilization or fall in output, so that unemployment rises. The effects of mechanization on welfare depend on the phase of the trade cycle: rising demand means rising total output, falling demand

means reduced output. If the mass of people is left in possession of sufficient purchasing power then the labour displaced by the new machinery can be reabsorbed to satisfy the growing wants of the people. The luxuries of to-day should become the necessities of to-morrow.

There is a particular tendency in a slump to mechanize in order to reduce labour costs per unit of output and under such conditions the effect on welfare is negative. Male labour may be further adversely affected by the employment of girls to operate the new machinery.

Monotony may be increased by higher mechanization, but effort is reduced and there is a possibility of shorter hours. Before 1850 the 70-hour week, representing almost the limit of human capacity, was typical; in the 1860's the normal for factory workers was 60 hours, and in 1913, 54 hours (an average fall over half a century of 10 per cent). Since 1919 there has been a further fall of 11 per cent, giving a 48-hour week, but 44 hours is quite frequent.

The Economy of High Wages

The entrepreneur does not measure wage costs by the rates paid but by the labour cost per unit of output. It may pay an employer to offer wages higher than normal if that enables him to get better workers whose higher productivity enables him to spread his overheads over a greater number of units of output. This advantage would naturally disappear if the higher rates were generally offered.

Inequality of Wages

Wage-rates may be unequal for several reasons, hinging mainly on the fact that labour consists of many grades in which the relative strengths of supply and demand vary, while labour flows with difficulty from one grade to another. Some jobs are more arduous than others, require a longer period of training or costlier training, a higher degree of skill, etc. The minimum subsistence wage is not therefore

a flat rate for all occupations, but each occupation has its conventional minimum which takes into account these special factors. The productivity of the labour is an important factor governing rates of pay, but the value of the product is itself affected by the difficulty of obtaining it; managerial labour is highly paid largely on account of the difficulty in obtaining good managers.

FURTHER READING

(a) *The Condition of Britain.* G. D. H. Cole. (Gollancz.)
(b) *Economics:* F. Benham (Pitman.) *World Economic Survey:* League of Nations. (Annual.)

CHAPTER II

MONEY, BANKING AND EXCHANGE

(1) MONEY

ECONOMICS is concerned with the production and distribution of wealth. The monetary system is not something apart from the productive system, it permeates this system. Money itself is but the counter giving right to the possession of real wealth and the so-called problems of money are also problems of production and distribution. The movements of prices illustrate this for prices are but the exchange values of goods expressed in terms of money. There are, however, so many technical aspects to the monetary system that it is convenient to consider these aspects and the problems to which they give rise as a distinct branch of economic study.

THE FUNCTION OF MONEY

Money is the link between production and consumption. The producer of goods exchanges them for money and then exchanges the money for other goods he desires. Money is an aid to commerce only, "the road along which all commodities travel but which in itself does not produce one single blade of grass" (Adam Smith); if it cannot be exchanged for goods it is nothing.

Originally trade consisted of barter, i.e. the direct simple exchange of goods for goods. That was practicable when producers were largely self-sufficient and exchanges were few. With the growth of specialization producers retained for themselves little of what they produced; the greater part they exchanged for other commodities likewise produced by specialists. The typical producer to-day does not directly utilize the product of his labour but exchanges it all for his requirements. In other words, in modern society

self-sufficiency is the exception and exchange the rule. In exchange a double coincidence is necessary: the seller must find someone who not only wants what he has to offer but is willing to give what the seller himself needs. For convenience therefore certain commodities became by custom used as intermediaries in barter. Blocks of tea or salt, hides, shells, have all served—and even still serve in some primitive communities—as barter units. Such commodities had their disadvantages, and finally silver and later gold became adopted as commodities to be used as intermediaries in trade. These precious metals had the following advantages in addition to being commodities desired in themselves: they were easily portable; indestructible; easily recognizable; homogeneous and divisible without the divided portions losing value as would be the case with diamonds; and finally they were stable in value since the annual output was low relative to the total stock.[1] Commodities would be exchanged against silver and silver would be re-exchanged for other commodities. It is important to note that silver was itself a commodity exchanging against other commodities on the basis of its intrinsic value (value inherent in itself) and that this silver money, which circulated in the form of bars before it was cut down into discs and stamped with the King's head as evidence of genuineness,[2] had no relation to our present money, which has no value in itself or a metallic value far below the face value. Our present coinage consists in fact of "tokens": counters with an exchange value as money out of all proportion to their intrinsic value as metal. Moreover silver and copper coinage has long been merely change for the standard money of the country, once the gold sovereign (commodity money) and now the paper (token) pound.

The change-over from a commodity money to a token

[1] The mnemonic DISHCUP gives the initial letters of the characteristics: Divisibility; Indestructibility; Stability; Homogeneity; Cognizability; Utility; Portability.

[2] The pound was originally 1 lb. weight of silver and the penny 1/240th part of a lb.

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money was very subtle and was made possible by the rise of a banking system and the growth of confidence in dealers in money. For convenience people would accept from their bankers paper tokens in place of metallic money of full intrinsic value on the understanding that metallic money would be surrendered on demand against presentation of the paper token. When the use of paper tokens had become customary it was possible for their use to be made legally compulsory and for their convertibility into a given quantity of precious metal to be abandoned without—for the purpose of internal trade—anyone noticing the difference [1] Goods are now exchanged against a token receipt which may be coin, paper, or even a record in a bank account, which in turn exchanges against other goods.

Money is essentially a medium of exchange, a debt-settling mechanism, as well as a unit of account, that is, a unit for the purpose of calculating exchange values as a yard is a unit for calculating linear values. Money may also be regarded as a store of value inasmuch as the holder of money does not necessarily wish to exchange it for goods at once and if the monetary system is working smoothly the value of the debt in terms of goods does not alter; money becomes then a standard for deferred payments.

It is clear that to facilitate exchange precious metals are not required; so long as ultimately goods can exchange for goods all that is necessary is for the existence of the debt pending the completion of the exchange to be recorded. The seller of goods receives money, that is, a record that a certain value has been handed over and that the seller is entitled to receive back an equivalent value when he chooses to present his debt token and to demand goods.

Different Kinds of Money

"Money is as money does" (Jevons): what serves the

[1] Details of how the change took place are discussed in the section dealing with changes in the monetary system since 1914

purpose of money, the settling of debts, is money. The various kinds of money may be classified as follows—

Legal tender: Money the use of which is authorized by law. If a debtor offers legal tender the creditor must accept or forgo the debt. (But note that creditors are not obliged to give change.)

Limited legal tender: May only be offered in settlement of debts of limited amount. In England copper coins are legal tender up to 1s. and silver up to 40s.

Full legal tender: May be offered in settlement of debts of any amount. In England Bank of England notes and gold coins, though the latter no longer circulate, are full legal tender.[1]

Intrinsic value money: The face or legal value is equal to the metallic or commodity value. (Gold sovereigns up to 1914.)

Token money: The face value is in excess of the commodity value, e.g. copper and silver coins and paper money.

Standard money: The money used as the unit of account. In England formerly the gold sovereign was standard, now the paper pound is standard and silver and copper coins are used as change for the standard unit.

Convertible money: Token money that may be exchanged for intrinsic value money, e.g. up to 1914 a £5 Bank of England note could be exchanged for five gold sovereigns and the Bank of England had therefore to hold sufficient gold coin to meet any possible demand for conversion of its notes. Paper currency is now inconvertible since intrinsic value money no longer circulates.

In addition to legal tender money there is *bank money* which takes the form of a record of debts in bank books transferable by means of cheques. Cheques are merely orders to a bank to transfer the ownership of bank deposits,

[1] The outbreak of war in 1939, with its dislocation of population due to evacuation, led to postal orders being temporarily (3rd September to 20th December) declared legal tender to meet a possible shortage of currency which did not, however, materialize.

they are not themselves money since if they were people could make themselves wealthy by writing out cheques for any amount they cared. No one can be forced to accept a bank deposit in settlement of a debt and the owner of a deposit can always require a bank to pay out the deposit in the form of legal tender money. Nevertheless bank deposits are the most important form of money used in business.

To sum up, money to-day is not gold and is not a commodity, but is simply a token of indebtedness indicating the holder's right to value in the form of goods and services. Gold is merely a commodity such as any other and its price is variable.

What is a Pound?

We have said above that money is merely a debt token, valueless and without meaning apart from goods. The pound is then a unit of account and exchange. The wording on a Bank of England note: "I Promise to pay the Bearer on Demand the sum of One Pound" above the signature of the Chief Cashier "For the Governor and Company of the Bank of England" would have meant up to 1914 an obligation to hand over sovereigns (commodity money) in exchange for the note (notes were then issued for £5 and over only). To-day the words have no meaning and the value of the note depends not on its exchangeability into a fixed quantity of one particular commodity, gold, but on its exchangeability into goods and services in general, that is, on its purchasing power. A pound is therefore what a pound will buy. The value of a pound varies with fluctuations in the level of prices. The higher the level of prices the less the pound will buy and the lower the value of the pound. The value of money varies inversely with the level of prices.

The Value of Money

A change in the general level of prices, unless due to a commodity factor affecting all business such as technical

improvement over a long period cheapening production costs and gradually bringing prices down, will be due to a change in the value of money brought about by a change in the volume of money relative to the number of exchanges for which that money has to serve. Money being only a unit of exchange and account it is clear that a doubling of the amount of money cannot double the country's real wealth but only cause a doubling of prices—if all the money is to be used to do the same number of exchanges—through a halving of the amount of goods each monetary unit represents. This is the so-called quantity theory of money—in reality an axiomatic proposition: with a given quantity of exchange the level of prices varies with the quantity of money used in those exchanges.

$$\text{Price Level} = \frac{\text{Quantity of effective money}}{\text{Volume of exchanges}} \text{ or}$$

$P = \dfrac{MV}{T}$ where T is the volume of trade, M is the volume of money in use and V is the velocity of circulation or rate of turnover of that money. Money not used in exchanges does not count as effective money and can have no influence on the level of prices at which the exchanges take place. Effective money is not the quantity of silver and copper coins, notes and bank deposits available, but only such part of this total as is in use multiplied by the rate at which it changes hands. A pound hoarded is not effective money at all; a pound changing hands once a year has an effectiveness of £1 only, but one changing hands once a week does the work of £52 in a year. The influence of the volume of effective money on prices will be appreciated too by realizing that effective money is effective demand. The quantity theory of money is in fact part of the supply and demand theory of prices. The following table shows the relationship between the quantity of money as represented by the daily average of cheques cleared and the level of prices, using both actual figures

and index numbers which are percentages of the 1929 figure.

		1929 £mn	1932 £mn	1937 £mn	1938 £mn.
Notes and coin in circulation (1)		341	349	457	463
	%	*100*	*102*	*134*	*135*
Bank deposits (2)		940	867	1192	1203
	%	*100*	*92 3*	*126 9*	*128·2*
Bank clearings (3)		151 5	108 3	144·3	133·1
	%	*100*	*71·5*	*95·2*	*88*
Wholesale Prices (4)	%	*100*	*75*	*95·2*	*88 8*

(1) Total circulation outside banks in Great Britain and Ireland
(2) Current accounts only of ten banks
(3) Average daily value of cheques passed through London Clearing House.
(4) Board of Trade figures.

The first two lines show simple *quantities* of money without regard to the rate of turnover, while the third line, cheques cleared, indicates the extent to which bank deposits are actually being used and follows price movements closely.

The Control of the Issue of Money

As the amount of money in use has a direct influence on prices it is necessary, if it is wished to regulate prices, to control the total volume of money. It is not possible to control directly the *use* of the available money without controlling the whole productive system so that the best the monetary authorities can do is to control the quantity *available* for use. (We are not considering here the extent to which a Government can influence the volume of business by increasing or reducing public spending.)

Who is responsible for the issue of the various kinds of money?

Coins are issued by the State through the Royal Mint. They go into circulation via the Bank of England, which buys them and resells to the commercial banks. A profit, represented by the difference between the face and the metallic value of the coins, less the cost of minting, is made on their issue and this goes into the national revenue. Control over the issue is automatic in that coins are used

only as change for notes and no more coins will circulate than habit requires as change.

Bank deposit money, the money used for all large payments, consists of nothing more than a debt by a bank to its customers or depositors evidenced by an entry in the customer's account. A bank can agree to make itself a debtor to its customers, that is, it can make loans to customers and enter the amount due in their accounts on which they can draw cheques, for as much as it likes, so there would be no limit to the possible creation of bank money were it not for the fact that it is not legal tender money and banks are obliged to meet their deposits on demand in legal tender notes. Banks therefore hold cash, i.e. coin and Bank of England notes, equal to one-tenth of their deposits. They do not need to hold cash up to the whole value of their deposits since all depositors do not withdraw the whole of their accounts at the same time, nor do they consider it would be safe to hold less than this proportion, so that for practical purposes the extent to which they can create bank money is limited by their holding of legal tender cash. How the volume of this held by the banks is controlled will be considered in the section on banking

Bank of England notes are issued by the Issue Department of the Bank of England which, though a private institution, works in very close touch with the Treasury. Additional notes get into circulation in this way: if the public require notes they draw them from their bank accounts and the joint-stock banks in turn draw additional supplies from their accounts at the Bank of England. An effective demand for notes only arises from persons having bank accounts and an increase in the volume of these accounts makes possible an increase in the circulating issue. If the withdrawals of notes by the joint-stock banks from the Bank become so heavy that the Bank's stock approaches exhaustion, then the Bank can obtain more notes by transferring securities from its Banking Department to its Issue Department in exchange for notes (see Bank Return).

When bank notes were convertible into gold on demand it was necessary for the Bank to avoid issuing notes too much in excess of its gold holding. From 1844 onwards the amount of gold that should be held was not left to the discretion of the Bank, but by law all notes issued above a certain quantity known as the Fiduciary Issue (backed by "faith" in the Government) had to have full gold backing. The Bank could issue additional notes only if it acquired more gold, and if it sold gold it had to cancel an equivalent quantity of notes in hand. Since September, 1931, notes have ceased to be convertible into gold but even so the Bank holds a certain quantity of gold as apparent backing for the note issue[1]—apparent, because the gold has no internal significance to-day and its sole purpose is as a reserve for international payments, that is, as a commodity which all countries will accept in settlement of debts when they will not take really useful goods. The amount of the Fiduciary Issue may be varied by the Government to permit of a larger or smaller issue of notes. It is therefore true to say that to-day the total volume of notes issued, the total of legal tender money, and the basis for the creation of bank deposits, is a matter of public policy and is not arbitrarily determined. The total volume of notes issued will be whatever the Government decides it should be. The gold held by the Bank is merely a commodity, the price of which is variable so that the stock has to be revalued each week. There is no connection between the amount of gold in the country and the volume of money or the level of prices. Nor is the gold stock any indication of the real wealth of a country, which is its productive power.

Changes in the Monetary System Since 1914

In 1914 money in the United Kingdom consisted of token silver and copper (limited legal tender); gold sovereigns and half-sovereigns (full legal tender and intrinsic value

[1] See p. 51 for the Bank Return showing the Issue Department.

money); Bank of England notes for £5 upwards (legal tender except by the Bank itself and its branches); the notes of the Scottish and Irish banks (not legal tender); and bank money, i.e. the deposits of the commercial banks (transferable by cheque but not legal tender). The pound was then a fixed weight of gold of 123·27447 grains standard (standard gold being metal 11/12 fine, 1/12 alloy being introduced for hardening), and 1 oz. gold would be sold by the Bank at the legal price of £3 17s. 10½d. On the outbreak of war in 1914 the Government appealed to the public on patriotic grounds to hand in their gold coins in exchange for a special issue of £1 and 10s Treasury notes (so called because they were issued by the Treasury and not by the Bank), which were declared legal tender. The gold coinage thus disappeared from circulation and was used to pay America for war materials and foodstuffs As backing for the Treasury notes there was little but faith represented by Government I.O.U.'s or Treasury bills. Theoretically both bank notes and Treasury notes remained convertible but people were dissuaded from demanding gold and its export was prohibited in 1917.

In 1925 when the export of gold was again permitted the convertibility of notes into gold was restricted to the sale of bars of gold of not less than 400 fine ounces[1] (Gold Standard Act, 1925). For eleven years gold, the commodity, had ceased to be the internal medium of exchange and now the use of this "barbarous relic" (J. M. Keynes) was to be confined to international payments. The price of gold was re-established at the traditional level of £3 17s. 10½d. per standard ounce, and the Bank of England had to sell gold on demand at this price and to buy all gold offered at £3 17s. 9d. per standard ounce, the difference representing an interest charge pending the former coining. The fixed relationship between gold and the pound meant that the country was on the gold bullion standard as distinct from the full gold standard of pre-1914 when gold coins circulated.

[1] Approximately £1,700 The price per fine ounce = 84s. 11½d.

By the Currency and Bank Notes Act, 1928, the State-issued Treasury notes were amalgamated with the bank notes. Liability for the Treasury note issue was transferred to the Bank together with the Government I.O.U.'s that "backed" the issue. In effect, of course, there was no backing since the Government could not meet its I.O.U.'s except by issuing fresh I.O.U.'s, but this did not matter in the least. The notes were required as money to convert into goods in the course of trade and not into any "backing" that might or might not exist. All that mattered was that there should be no note issue in excess of the needs of trade as this, being a relative increase in the volume of money, would raise prices. During 1914–18 excess issues of Treasury notes had been made and there was an inflationary rise in prices, discussed later. Having taken over the note issue, the Bank proceeded to call in the old Treasury notes in exchange for the present Bank of England notes.

The Act of 1928 replaced the rigid limitation on the amount of the Fiduciary Issue imposed by the Bank Charter Act, 1844, by a more elastic provision. Under the old Act it was only possible to expand the note issue (except, of course, if gold were bought) by suspending the Act; now it was provided that the Treasury could authorize an increase in the Fiduciary Issue for six-monthly periods up to two years, after which the special permission of Parliament was necessary. This "elasticity" clause is sometimes invoked at Christmas when there is an exceptional demand for currency.

The abandonment of the gold standard in 1931 meant that the Bank was no longer obliged to sell gold on demand. The price of gold was therefore free to move in the bullion market, but this had no significance so far as the internal monetary system was concerned. The price level in terms of pounds was not affected by the change. The significance of the gold standard and its abandonment is discussed later.

In 1939 there were passed early in the year another Currency and Bank Notes Act and on the outbreak of war

a Currency (Defence) Act, the effect of which was finally and completely to break any connection between the country's gold stock and the note issue.

(2) BANKING

Development of Banks and Their Functions

The early bankers were really moneylenders. They received gold or silver bullion and gave in exchange deposit receipts which would be presented when the deposit was reclaimed or which could be passed, in the same way as a bank note, to a creditor who would withdraw the deposit. These bankers made loans first from their private wealth and later, when they saw that the depositors were unlikely to reclaim the whole amount deposited, from the wealth deposited with them. These loans, however, were loans of actual commodity money, i.e. the banker only lent what he had. The difference between a moneylender and a banker is that the moneylender lends what he has and the banker lends what he has not got, which is much cleverer. The banker in effect lends only his *promise* to pay legal tender money and his loan originally took the form not of actual gold or silver but of a bank note issued by himself (before 1844 private banks could issue their own notes) which he was of course liable to redeem in gold or silver. The modern banker makes his loan in the form of a bank deposit on which the borrower is authorized to draw by cheque. In both cases the banker makes himself responsible to pay out legal tender money against his promise. But the banker relies on his experience that people who have confidence in banks prefer to leave it in the form of a bank account, i.e. in the form of debt owing to them by the banker, rather than to hold it in the form of cash. Cheque payments merely involve transfers from one account to another with no withdrawal of money from the banking system as a whole

When money is withdrawn from banks in notes the notes soon find their way back to the banks from the recipient, and the main precaution the banker has to take is that he

always has enough legal tender money on hand to meet the largest likely withdrawal. The more confidence there is in banks and the more people tend to keep their liquid wealth in bank accounts the less legal tender money will the banker have to keep in hand in proportion to his debts.

The moneylender lends out his own money or the money actually deposited by customers with him, and his power to make loans is limited by the amount of money he has. He cannot lend more than this sum, less a safety margin held in reserve to pay back the amount due to any depositor who may demand it. The bank does not lend out either the cash subscribed as capital by its shareholders or the cash paid in by depositors. Instead it opens an account for the borrower, and the power to make loans is limited only by the fact that a certain proportion of the debts due by the bank are liable at any one moment to be claimed in cash, so that these debts may not exceed infinitely the sum of cash the bank has in hand. The more cash the bank has in hand the larger the volume of deposits for which the cash can act as reserve. In England now, banks do not let their deposits (debts due to their customers) exceed ten times their cash in hand. This proportion is known as the cash ratio of the banks.

There is a distinction between bank credit, which is money, and credit. Credit is faith, confidence in a debtor, and while a bank can create money (book debts owing by itself) it cannot create credit, which is a quality of its borrowers. Put in another way the bank replaces the credit of the borrower (in which the bank has faith) with its own credit (in which the public has faith). A person having credit (or being credit-worthy) can borrow on the strength of that credit by pledging it with his bank. This credit may be secured, or backed, by valuables or titles to property which are deposited with the bank or it may be secured simply by the borrower's promise to repay and the banker's confidence in the soundness of his business. Bankers who make loans must therefore be adept at valuing at its true

worth the credit of a would-be borrower. They must pay close attention to the security offered, its convertibility and, of course, the interest receivable, which is the bankers' profit. Since the banker's own obligations to his customers are payable on demand he wishes his loans to be liquid as well and he is only interested in assets that are quickly realizable. Before a bank makes an advance to a limited company it has the right to see the certificate of incorporation, the certificate to commence business, the Memorandum and Articles of Association, in order to ascertain the company's powers of borrowing, and the resolution of the Board of Directors authorizing the borrowing.

This function of banks, the making of loans to commerce and industry, is most important. It assists production enormously in that it enables producers to buy materials, pay wages, etc., in advance of obtaining the proceeds of the sale of the finished article. This inevitable time-lag between paying out for the costs of production and being reimbursed by the sale would have to be covered by the personal wealth of the owners of enterprises did not the banks provide finance. Private capital provides the funds necessary to buy the fixed assets of a business and banks provide the funds necessary to meet current expenses of production. Bank loans are of special importance in merchanting businesses where they may finance the carrying of the whole of the stock in trade. The total value of bank loans (eleven clearing banks) was £961 millions in autumn, 1937, and £954 millions in autumn, 1938, and the table on p. 46 shows how these sums were distributed among different industries. Observe the very large proportion of unclassified loans made to private and professional persons under the head of "Other Advances." The chairman of Barclays Bank has said that the average advance of his bank was £854 and that 87 per cent of advances were under £1000. Only about one-third of bank loans are truly industrial. Large firms frequently tend nowadays either to borrow directly from the public to finance production costs or

else to build up large reserves for the same purpose and thus to avoid borrowing from banks. In the winter of 1929–30 the first seven categories below accounted for 37 per cent of total loans, while in the last three years they account for only 25 per cent of the total.

CLASSIFICATION OF BANK ADVANCES
(ELEVEN LONDON CLEARING BANKS)
Average of autumn figures 1936–38.[1]

	£ mn	%
Textiles (Cotton, Wool, Silk, Linen, Jute)	41	4·4
Heavy Industries (Iron, Steel, Engineering, Shipbuilding)	46	5·0
Agriculture and Fishing	60	6·5
Mining and Quarrying	16	1·7
Food, Drink and Tobacco	33	3·6
Leather, Rubber, and Chemicals	13	1·4
Shipping and Transport (including Railways)	23	2·5
	232	25·1
Building Trades	66	7·1
Miscellaneous Trades	71	7·6
Retail Trades	63	6·8
Local Government Authorities and Public Utility Companies	54	5·8
Amusements, Clubs, Churches, Charities, etc	44	4·7
Financial (including Banks and Building Societies)	112	12·1
Other Advances (including private and professional)	286	30·8
	928	100·0

Although the bank loan or overdraft is the most popular way of financing business other than out of capital, there is an older method of less importance now than formerly, the bill of exchange, more used in foreign trade than at home

[1] Adapted from Bank of England Statistical Summary, Nov., 1938.

N.B In this and subsequent tables the authors have refrained from the use of 1939 figures, even when available, where these are affected by the war.

and more popular on the Continent than in this country. A bill of exchange is an acknowledgment of debt and an agreement to meet it within a stated period, usually of one to three months. The creditor draws the bill on the debtor on the following lines: "Pay to (myself) or order (three) months from date the sum of (one hundred pounds)." The bill must be dated and falls due three days after the apparent due date, these customary additional days being known as days of grace. Further, the bill must be stamped at the rate of 1s. per £100. The debtor, if he agrees to the terms of the bill, signs across it with the word "accepted"; the document may then be known as an acceptance. A cheque is a bill of exchange drawn on a banker and payable on demand. A promissory note is a similar document to a bill only it is drawn up by the debtor himself and begins with the words "I promise to pay . . ., etc.," and it obviously does not require acceptance.

A creditor who does not wish to wait for payment till a bill he has been given falls due may transfer the debt to his bank by discounting the bill, that is, by selling the bill to the bank. The bank treats the bill as a short-term loan and deducts interest, known in this case as discount, from the amount advanced to the creditor. When the bill falls due the bank presents the bill for payment to the acceptor (the debtor), but if the latter will not meet the bill then it is termed dishonoured and handed back to the creditor, who of course has to reimburse the bank with the amount of the loan. The creditor must then take the matter up with the debtor.

Bills of exchange, promissory notes and cheques are negotiable instruments, that is, the title to the debt they represent may be transferred from one person to another either by mere delivery if the instruments are payable to "Bearer" or by the endorsement of the transferor if the instrument is made payable to a specified person or to "Order."

An accommodation bill, also known as a kite or windmill, is a bill drawn by a person wishing to raise money on another

party who is not a debtor but is willing to accommodate the drawer by "accepting" the bill. The drawer of the bill can then discount the bill at his bank but it is understood that he will pay the acceptor the money required to meet the bill on its due date. Sometimes one branch of a firm draws a bill for the same purpose on another branch which goes under a different name. Such a bill is known as "pig on pork," and banks do not like discounting bills of this nature since there is no treble security behind the loan. A legitimate trade bill has behind it the security of the goods which have been sold, that of the drawee and that of the drawer, but an accommodation bill has no goods behind it.

Banks will, for a commission, accept bills on behalf of their customers. This service is of special importance in foreign trade where the exporter may not be willing to part with goods against the signature of a firm he does not know but will gladly take a bank acceptance. The accepting bank lends only its name and expects its customer to pay in the funds to meet the bill when due, though it will have to meet the bill in any case should the debtor default. Bank acceptances can be discounted at far lower rates than ordinary trade bills since their security is greater.

The main reason why in the home trade bills are less used than formerly seems to be a desire on the part of debtors to avoid letting their creditors see that they cannot pay cash. They prefer that only their banker should know their lack of liquidity so they borrow from him and pay cash. This shyness is somewhat unreasonable when it is remembered that it did not always exist here, is quite absent on the Continent, and that business men know perfectly well that all their friends and rivals are working on overdrafts.

To sum up, the functions of a banker in aiding exchange and thus aiding production are essentially threefold, viz.—

(1) Cloak-room facilities: the depositor leaves his cash with his bank and takes it away at will. Deposits may be either on "Deposit A/c" (withdrawable on seven days' notice) or on "Current A/c" (withdrawable by cheque on

COMBINED BALANCE SHEET OF "BIG FIVE"
(in order of size. Midland; Barclays, Lloyds, Westminster; National Provincial)

31ST DECEMBER, 1938

Assets are also shown as a percentage of total deposits.

Liabilities	£ mn	*Assets*	£ mn.	%
Capital and Reserves .	120·5	Cash (1) . .	218·7	11·2
Deposits . . .	1,950 1	Cheques, etc (2) .	76·0	3 9
Acceptances, etc (7) .	104·8	Call Loans, etc (3)	120·7	6·2
		Treasury Bills and Discounts (4) .	217·2	11·1
		Investments (5) .	545 3	28 0
		Advances (6) .	855·8	44·0
		Premises and Sundries . .	36·9	
		Acceptances, etc (7)	104 8	
	2,175·4		2,175·4	

(1) Rather more than half is till money and the balance is held with the Bank of England withdrawable on demand

(2) Cheques paid in by customers drawn on other banks which are in process of collection

(3) Loans to the money market (q.v).

(4) Bills discounted and payable either by the Treasury or by banks or merchants

(5) Mainly first-class securities ("gilt-edged") such as long-term Government loans.

(6) Commercial loans made to customers.

(7) Bills accepted by banks on behalf of customers which the banks have to meet but on which the customers are also liable to the banks

demand); the ratio between the two is approximately 50:50 though the proportion of Current Accounts increases when trade is good and money is being used more.

(2) Credit monetization: making loans and discounting bills to convert the credit of customers into bank credit (money).

(3) Agency functions; the collection of cheques drawn on other banks; the acceptance and collection of bills of exchange; dealing in foreign exchange to assist the settlement of overseas debts; Stock Exchange, trustee and executor business; safe-deposit facilities; making standing order payments; supplying change and assisting the central bank in keeping the note issue in good condition.

These agency functions, although very numerous and very extensively used, are not very remunerative, nor is the provision of cloak-room facilities though charges are made for the keeping of current accounts based on the amount of work involved. Banks make their profits chiefly on the interest received on their long-term loans and investments, which is far higher than the interest they pay on deposit accounts. The capital of the banks is, however, small in relation to the total assets (some 6 per cent) so that a small average rate of profit on the earning assets becomes a very handsome rate on the shareholders' capital. Although it is complained that banks charge too much on their overdrafts, a 1 per cent reduction on these would almost extinguish the dividends paid.

Bankers' Clearing House

The eleven leading English branch banks are members of the London Clearing House. Every branch office (with the exception of those in eleven provincial districts which have their own local clearings) sends in daily to its head office the cheques which have been paid in to it drawn on other branches or banks. The cheques drawn on other branches of the same bank are settled through the account which each branch keeps with its head office; those drawn on other banks are sent to the Clearing House where they are handed over to the bank concerned, while the debts due between the banks are settled through the account which each bank keeps with the Bank of England.

The Bank of England

The centralized English banking system consists essentially of a group of commercial banks, the functions of which have been outlined above, all keeping accounts with the Bank of England through which they settle the debts that arise between themselves. The Bank of England is therefore known as the central bank and as the bankers' bank.

The Bank was founded in 1694 as a private firm which it

remains although its dividends are limited by custom and it works in close contact with the Treasury. To-day its main functions are to issue notes, to keep accounts for the Government and for the commercial banks—as well as for foreign central banks—and to control interest rates and the value of the pound both internally (the home price level) and externally (foreign exchange rates). The control of the external value of the pound is carried out in conjunction with the Treasury, which also has power to determine the size of the note issue. The weekly balance sheet of the Bank is published in the Press every Friday and shows the position at close of business on the preceding Wednesday. The following is an average of the weekly figures for April–June, 1939.

THE BANK RETURN

average of weekly figures April–June, 1939

Issue Department

	£mn		£mn.
Notes issued:		Government Securities .	298·8
In Circulation . .	493·8	Other Securities . .	0·4
In Banking Department	32·4	Silver Coin . . .	0·8
		Total Fiduciary Issue .	300·0
		Gold Coin and Bullion[1] .	226·2
	526·2		526·2

Banking Department

	£mn.			£mn
Capital .	14·5	Government Securities .		111·1
Rest . .	3·3	Discounts and Advances . .	7·3	
Public Deposits . .	21·0	Other Securities .	22·5	29·8
Bankers' Deposits .	97·7			
Other Accounts . .	37·5	Reserve of Notes and Coin		33·1
	174·0			174·0

Notes on the Return

Notes in circulation are those outside the Bank but include those held as till money by the commercial banks.

[1] This item has virtually disappeared (September, 1939) and is now replaced by additional Government Securities.

The Fiduciary Issue includes in the Government securities a sum of slightly over £11 millions of Government Debt representing borrowings of the State from the Bank in the first century and a half of the latter's existence. By the Currency and Bank Notes Act of 1928 (amalgamation of Treasury and Bank note issues) the total of notes that could be unbacked by gold was raised from £19¾ millions to £260 millions subject to the "elasticity" clause. Between August, 1931, and April, 1933, the Fiduciary Issue was £275 millions, sales of gold having made it necessary to transfer £15 millions of Government securities from the Banking to the Issue Department. In December, 1936, £60 millions of gold was bought from the Treasury against £60 millions of Government securities, thus reducing the Issue to £200 millions. Between November, 1937, and January, 1938, the Issue was increased to £220 millions by a transfer of securities from the Banking Department to meet the Christmas demand for notes, and there was a similar increase to £230 millions between December, 1938, and January, 1939. In January, 1939, £200 millions of gold was sold to the Treasury against Government securities, thus raising the Issue to £400 millions. On 1st March, 1939, by virtue of the Currency and Bank Notes Act, 1939, the Bank's gold stock which had hitherto been valued at the statutory price of 84s. 11½d. per fine ounce was revalued at the market price of over 148s. and gold representing the excess value handed to the Treasury. The Treasury then sold to the Bank £100 millions of gold against Government securities, thus reducing the Fiduciary Issue to £300 millions. On the outbreak of war in September, 1939, the Treasury took over practically the whole gold stock of the Bank in exchange for securities, the amount of the Fiduciary Issue being raised to £580 millions, though, as we have seen, in face of a special seasonal demand for notes this Issue can always be increased by bringing in securities from the Banking Department and handing over the additional notes issued against these securities to the Banking Department Virtually the

whole note issue is now Fiduciary. The gold stock of the country is therefore completely divorced from the note issue.

Gold: revalued each week. For the period shown above the average price was 148s. per fine ounce. Adjustments of the market value to the book value were made by transfers between Bank and Treasury to keep the book value constant.

Rest: a reserve of the Bank of some £3 millions plus accumulated profits which are paid out half-yearly.

Public Deposits: the deposits of the various Government Departments.

Bankers' Deposits: the deposits of those banks whose business is mainly in this country, and almost entirely of the eleven clearing banks.

Other Accounts: deposits of overseas and foreign central banks together with a few long-standing private deposits. The Bank no longer opens accounts for private persons or firms.

Discounts and Advances: bills rediscounted for and loans made to money market firms on the initiative of the latter.

Other Securities: securities other than Government securities bought by the Bank on its own initiative.

Notes and Coin: the cash reserve of the Bank, the notes being the surplus of the issued notes not yet in circulation. These notes go into circulation when the commercial banks draw on their deposits with the Bank.

The Money Market

This is in effect the mechanism through which all the financial institutions in the City of London come into contact with each other to borrow or to lend. In the "market" are the big joint-stock banks, many London private banks, including the merchant banks, bill-brokers and discount houses. The Bank of England is outside the market and controls it.

The many institutions which make up the money market are relics of the days prior to the formation of the Big Five with their omnibus facilities. English joint-stock banking dates only from 1833, and the giant banking combines are creations of the period after the 1914–18 war. London as the world's commercial capital developed a great range of firms specializing in every aspect of finance. Some firms accepted bills (acceptance houses), others discounted them (discount houses), others acted as intermediaries between those who had bills to sell and those who wished to invest (bill-brokers). Acceptance houses were usually merchant bankers, firms who had graduated from merchanting to banking, specialists in the commerce with overseas countries and channels through which capital was found for the development of these countries. But now that the joint-stock banks provide all these facilities the older institutions have lost their original purpose and to keep alive have to multiply their functions. The acceptance houses are small replicas of the newer banks; discount houses and bill-brokers form a closed ring into which no new firm may enter to compete, and the houses have become more and more discounters of Government Treasury bills and the channel through which the Government borrows.

The Treasury bill is the main "commodity" of the market to-day. It is a promissory note issued by the Treasury and running for three months, offered for discount every Friday by tender. The Government receives the value of the bill less discount and at the end of three months repays the principal by an issue of fresh bills. The bills are very popular with all firms which have money to invest which they want to keep liquid since they are a first-class security and being due to be repaid at the end of three months they cannot lose value. Any holder of Treasuries can rediscount them quite easily with a discount house or a bank or in the last resort with the Bank of England.

The discount houses borrow money at "call" or "short-term" from the joint-stock banks and receive deposits from

the public which they invest in commercial bills (if any are available), Treasury bills, or long-term securities. Their profits derive from the difference in the interest rates on their loans and their discounts and investments, as well as from "jobbing"—dealing in securities with a margin between buying and selling prices.

Interest Rates

The banks lend money to the "market" at call rate, a very low rate of interest since the loan is repayable on demand and is fully secured by a deposit of securities with the bank. The market discounts bank bills (bills of exchange accepted by a first-class bank) at market discount rate, which is almost the same as the Treasury bill rate for discounting the Government bills. Trade bills are those accepted by commercial firms and the rate for discounting these varies according to the standing of the firm but is always far higher than the rate for bank bills. Loans to customers come outside the money market proper and the rates on such loans vary according to the credit of the borrower, but since the loan is at relatively long term and cannot be passed on to another institution rates are higher than in the "market."

Market rates are governed by the supply of loanable funds in relation to the demand for loans. The commercial banks will always aim at keeping their market loans and discounts as high as possible in order to increase their revenue, but their power to expand their assets depends upon their cash holding. At the year-ends when the banks prepare their balance sheets for publication, and to a lesser extent at the half-years, a time-honoured custom takes place known as "window-dressing." The banks call in some of their *market* loans (not their loans to business) in order to make a brave showing of cash in their balance sheets The banks defend this calling-in by saying that it is a good thing to test the soundness of their clients from time to time by sending them elsewhere to borrow. But if for this or any

other reason the banks are unwilling lenders the "market" can borrow at the Bank of England, the lender of last resort. The Bank will always lend provided there is adequate security and at a price. The price charged depends on Bank Rate, which is the minimum discount rate of the Bank of England for first-class bank bills to other than its regular customers. This rate, which has been unchanged at 2 per cent since June, 1932,[1] is the "roof" of the market and is not intended to become an effective rate unless monetary conditions are so stringent that borrowers are driven to the Bank.

THE SIGNIFICANCE OF INTEREST RATES

If there is a relative shortage of funds and market and customer loan rates rise (a rise in Bank Rate is important only in so far as it reflects or initiates a rise in market rates), borrowers are penalized All industrial and commercial borrowers will be affected but particularly middlemen who carry stocks on borrowed money. If they have to pay a higher rate they will try to reduce their total borrowing and so liquidate some of their stocks. This tends to depress home trade since it results in fewer orders for manufacturers while the process of liquidating is going on. Another result is to cause a drop in prices owing to the liquidation and the business depression, and this, other things being equal, may encourage exports. A final result is that funds due to foreigners will tend to remain in this country, and foreigners may even make fresh deposits here to benefit from the higher rate of interest, so that, other things being equal—that is, if there is no counterbalancing cause to scare foreign funds away—the demand for pounds sterling will mean a rise in the exchange value of the pound. Broadly speaking, high interest rates are restrictive on business while low rates encourage borrowing and enterprise.

[1] The imminence of war caused an increase to 4 per cent on 24th August, 1939, but by the end of October the old level had been restored

Control of the Monetary System

The influence of interest rates on business activity has just been observed, but interest rates only reflect the relation between the supply of and the demand for loanable money. Therefore some conscious management of the monetary system is desirable in order to try to maximize sound business activity. Money represents demand; the more money there is in use at a given level of prices the greater the demand for commodities. An increase in demand, not immediately met by increased production, may also raise prices, which tends, by increasing profits, to encourage further enterprise. It is true that the buying power of fixed incomes is reduced and that where money incomes are increased the rise in *real* incomes is not as much. But if there is an increase in business activity and in employment there is an increase in the total real national income from which many sections of the population will benefit. If, however, prices rise excessively then there are likely to be disturbing effects on the distribution of real incomes. Profits will increase out of all proportion to other incomes, and the majority of real incomes are reduced to the benefit of a rise in the real incomes of a small section of the population. This excessive rise in prices indicates *inflation*, an increase in the volume of money in use out of all proportion to the increase in consumable output.

A reduction in the amount of money available will restrict spending and investment, and though it may originate in a desire to stop speculation and "unsound" investment (investment in enterprises for whose products there will be little demand) its certain effect will be to cause a slackening in business activity and a rise in unemployment This decline in volume of money relative to output is *deflation*. After a period of deflation an attempt may be made to increase the amount of money in use in order to raise demand, prices and profits back to a "normal" level. This limited inflation is called *reflation*.

Moving prices are undesirable since they cause business

uncertainty and changes in real incomes relative to money incomes. But if prices are to move, then slightly rising prices and a rising money circulation are best since, in an imperfect economic system where much capital and labour may be idle, they stimulate production, and cause an increase in employment and a rise in the total of both money and real incomes. It is important to notice that it is not the *level* of prices that matters but whether prices are rising or falling.

The control of the Bank of England over the monetary system and prices can be better understood if followed in conjunction with the Bank Return and the Balance Sheets of the Joint-stock Banks. Assuming that the Bank wishes to increase the volume of money, it will buy securities (especially Treasury bills) in the "open market" (from discount houses, brokers, banks) and pay for them by crediting the accounts of the banks with which the sellers have accounts. The Bank Return will show an increase in both Securities and Bankers' Deposits. The commercial banks have an increase in cash (at the Bank of England) balanced by increased deposits for their customers, or if they have themselves sold securities then the increased cash is balanced by a reduction in investments. The higher cash ratio of the banks now enables them to increase their deposits till they rise again to ten times their cash. This they do by buying securities, making loans if approached, and lowering interest rates to encourage borrowers. Additions to the assets of the banks are paid for by crediting the deposit accounts of customers, these deposit accounts being, of course, money.

Given a purchase of securities by the central bank and the maintenance by the commercial banks of their traditional cash ratio the increase in the deposits of the latter is automatic. The borrowed money will, of course, be spent and the money obtained from the sale of securities to the banks may be spent; if so prices and trade may recover. But if business is very depressed it will take more than a readiness

on the part of banks to lend to cause new borrowing, and the increased deposits derived from the sale of securities to the banks will remain idle. There are therefore limits to the efficacy of mere monetary expansion in causing trade revival: "You can take a horse to the water but you cannot make it drink."

The following table shows the relation between various items affected by an expansionist monetary policy and the level of prices and business activity—

	Bank of England		Joint-stock Banks[1]		Advances	Wholesale Prices	Business Activity
	Total Securities	Bankers' Deposits	Investments	Deposits		Index numbers	
	£mn	£mn	£mn.	£mn	£mn		
1930	76.5	65.5	258	1,801	963	100	100
1931	84.1	64.7	301	1,760	919	88·1	93.0
1933	105.5	99.9	537	1,953	759	85.7	95.6
1935	108.5	96.7	615	1,999	769	89.0	107.5
1937	126.1	97.2	652	2,287	954	108.7	120.5
1938	133.7	106.2	637	2,277	976	101.4	112.3

[1] The 1937/8 figures are for 11 banks, previous to that 10 The additional bank meant an increase in deposits of some £70 millions, investments £30 millions, advances £25 millions

The use of Bank Rate as a weapon of monetary policy is best illustrated in a time of restriction. If the Bank wants to make money dearer it can raise its rate, but this will not be effective unless the market is trying to borrow from the Bank on account of a shortage of funds. If the market is "easy," then the Bank will have to accompany its higher rate by an open-market policy of *selling* securities. These sales, which are necessarily to customers of the commercial banks, are settled by reducing the bankers' balances with the Bank. The banks suffer a reduction in their cash and in the deposits of their customers who have bought securities. Their cash ratio is now lower, and to restore it market loans are called in, securities are sold, discounting will be refused, money rates will rise, and the market will have to borrow at the Bank of England, which puts up its own rate. The Bank's power to restrict the use of money is even greater

than its power to increase its use, and it is in fact irresistible. In either case the Bank has absolute power to increase or to decrease the volume of available funds though it cannot guarantee that where additional funds are created they will be used. This becomes a matter for Government policy.

The only limitation to the Bank's power to buy securities and to increase the cash of the commercial banks is the fact that the Bank has its own cash ratio to look after The deposits in the Bank are withdrawable in the form of notes, and the Bank therefore keeps a cash reserve, the size of which is, however, very elastic: the ratio of the reserve of notes and coin to total deposits has varied on the average in recent years between 30 and 40 per cent, but the tendency is for it to become lower and to vary (1938–9) between 20 and 30 per cent. If the Bank in order to expand its deposits should wish to increase its cash to ensure that the reserve should not fall too low it could, *with Treasury permission, monetize* securities by transferring them from the Banking to the Issue Department and replacing them with notes But since the Treasury alone may authorize the increase in the Fiduciary Issue which enables the Bank to expand the volume of money, the Treasury is the final arbiter of monetary policy.

Banks and Industry

As the deposits of the commercial banks are repayable on demand, or on seven days' notice, the banks aim at keeping their assets liquid. Market loans may be called in at a moment's notice; bills can be rediscounted (though to do so would cause a shock since it is a traditional policy of the joint-stock banks never to rediscount); investments can be sold, though this would be difficult on a large scale; but loans, which may equal 40–50 per cent of deposits, cannot be transferred. Bank assets are therefore liquid only to a limited extent and even so only by transfer to other banks. Liquidity for the whole banking system is not possible

unless indeed the Bank of England took over all commercial bank assets and expanded its Fiduciary Issue in order to print the notes with which to pay for them. But a general liquidation could only arise in a panic in which the simplest course would be for the Government to close the banks, as President Roosevelt closed all the American banks in the panic of March, 1933, and to reopen them when confidence was restored.

However, though general liquidity is impossible, the British banks have always desired a considerable degree of individual liquidity—a relic of the days of smaller and less well established banks—so that while they provide short-term capital for business—capital to be used to buy raw material and pay wages—they are less prepared to supply long-term capital for investment in machinery, buildings, etc. In the depression years 1932–3 several finance companies were established to extend credit to small businesses which needed development capital but could not get bank loans. However, these finance companies usually insist on such a degree of established soundness in their protégés that the new and possibly promising small concern must still rely on personal contacts for finance. There is no mechanism in existence which can (*a*) examine the technical merits of a new proposition, (*b*) nurse the new firm or industry financially through its early years to bring it rapidly to a stage when it can make a direct appeal for funds to the public.

The old-established heavy industries can, however, get financial assistance through the banking system and its contacts, such as the insurance companies. In 1929 the Securities Management Trust was established by the Bank of England for this purpose, and in 1930 the Bankers' Industrial Development Company was formed jointly by the S.M.T. and the joint-stock banks. Various schemes of rationalization have been carried out through these channels in the iron and steel, coal, shipbuilding, cotton and tinplate industries

International Banking

Through the agency of the Bank of England central banks were set up in the Dominions in the post-war period. In 1930 the Bank for International Settlements was established at Geneva to act (1) as agent for the transfer of war reparation payments from Germany to the former allies, and (2) as a central bank for central banks. The first function came to an end with the cessation of reparation payments in 1932, and the second function is in practice unimportant. The monthly board meetings provide convenient opportunities for contacts between central bank chiefs, but in a politically divided Europe it is questioned whether there is any value in these contacts.

(3) FOREIGN EXCHANGE

Foreign exchange is the name given either to foreign currency or to the means by which debts between foreign countries are settled. Since money is essentially bank debts, it cannot physically move from one country to another, but debts in one country must be exchanged for debts in another. The process of making international payments is therefore one of exchanging the ownership of bank balances: an Englishman making a payment to France must obtain a bank balance in francs and give in exchange his bank balance in sterling. The proceeds of British exports give merchants and banks in this country foreign currency which they use in payment for imports.

The Mechanism of Exchange

Foreigners may pay for imports with cheques or bills of exchange. The British exporters sell these for sterling to their banks, who get them collected in the foreign centre and put to their accounts. British exporters now have deposits with home banks, and the latter have deposits with foreign banks which formerly belonged to foreign importers. British importers can pay their banks sterling and in exchange receive cheques drawn on the banks' foreign deposit

accounts with which they pay their foreign creditors. For speedier payment telegraphic transfers (T.T.) are used: the British bank wires to the foreign bank with which it has an account to transfer the deposit at once to the account of a specified person For large amounts T.T.'s are invariably used since at the same time that the British debtor pays sterling into his bank the foreign bank pays foreign currency over to the creditor. Mail transfers (M.T) are instructions to make payments similar to T.T.'s but sent by post. Both M T 's and T T.'s are safer than cheques since there is no danger from loss

Exchange Rates

The ratio at which exchanges between two currencies take place is governed by the laws of supply and demand. This is best illustrated by taking the rate of exchange between the British and New Zealand pound. The purchase of New Zealand goods by this country means the payment of sterling into the New Zealand banks in London, for account of the New Zealand branches, for account in turn of the New Zealand exporters Out of these sterling balances New Zealand can pay for imports from this country. When the payment of sterling into these accounts and the withdrawals out of these accounts are in equilibrium then the rate of exchange will be steady. But if New Zealand increases her imports her London balances will gradually become exhausted and the New Zealand banks will approach a position when they will be unable to supply any more sterling and when New Zealand will be unable to pay for any more imports. Before this point is reached, however, the New Zealand banks will respond to the demand for sterling by raising its price in terms of New Zealand pounds, quoting, say, £NZ130 per £100. The New Zealander wishing to buy British goods finds he must pay to his bank in New Zealand £NZ130 for £100 to be paid out in London, and this by making imports dearer checks them. But the British importer finds that if he pays £100 into the New Zealand

bank in London he gets £NZ130 which encourages him to buy New Zealand produce

In the case of currencies other than those of the Dominions, which, with the exception of Canada, are only dealt in through a small "ring" of banks which all charge the same rates, deposits abroad are held by a large number of London banks and there is considerable competition among these in the buying and selling of their foreign currency balances so that there are considerable fluctuations in quotations The same principle, however, governs the movement of exchange rates when there is a heavy demand for foreign bank balances the price of these rises and less foreign currency will be given per £; but when foreign bank balances are being heavily sold, that is when foreign debts to this country are in excess of this country's debts abroad, more foreign currency will be given per £.

The Balance of Payments

What is behind this supply of and demand for exchange? The demand for foreign currency arises from British imports which must be paid for in foreign currency, while the supply arises from the proceeds of British exports. The balance of supply and demand is known as the Balance of Payments or the Balance of Indebtedness, and in the case of this country many items enter into this balance other than imports and exports of goods. Imports, in fact, are paid for not only by merchandise exports but also by so-called "invisible exports," the performance of services such as shipping, banking, insurance, merchanting. In addition this country has some £3700 millions of overseas investments and the interest on these is ultimately paid for in the form of imports The table on page 65 shows the British balance of payments for the average of the years 1936–8.

Payments between countries can only be made in goods, including precious metals, or services; e g. the possession of pounds is of no use to an American unless to spend or invest in this country. The deficit indicates that this

BALANCE OF PAYMENTS

AVERAGE FOR 1936–8

Demand for Foreign Currency		*Demand for Sterling*		
	£mn			£mn
Total Imports	932·0	British Exports		477·6
Less Re-exports	65·8	Silver (Net Exports)		0·7
Retained Imports	866·2	Total Visible Exports		478·3
Net Government Payments Overseas	6·7	Shipping Income	105·0	
		Investment Income	205·0	
		Commissions	35·0	
Total Payments Due	872·9	Miscellaneous	7·0	
		Total "Invisible" Income[1]		352·0
		Total Payments Receivable		830·3
		Net Deficit		42·6

country incurred, over the years 1936–8, debt to other countries for goods supplied at the rate of some £40 millions per annum Foreign banks have been acquiring balances in this country at this rate. It is possible that these balances have been withdrawn in gold, but the above table takes no account of gold movements since gold is often sent to this country for safekeeping or shipped elsewhere for the same purpose. It is not possible to tell whether gold is being moved in settlement of debts or merely as a depositor might move his account from one bank to another.

A deficit in the balance of payments does not necessarily involve sales of sterling since the foreign owners of sterling may be content to invest it in this country. Formerly the British balance of payments was "favourable" (more debts owing to this country for exports than owing by it for imports), and the "surplus" exports were invested abroad, the interest on them now being received as "surplus" imports.

Foreign loans may be made directly to Governments, to companies operating abroad, or in the form of private investments, but the loan is necessarily in a tangible form, e.g. exports of industrial equipment, although if the lending country's export trade is in a weak competitive position the

[1] Estimates of Board of Trade.

borrower may wish to sell his borrowed currency for the currency of the country where he wishes to buy, thus depressing the value of the lender's currency. Nowadays lenders insist, unless there is a special reason, that overseas loans be spent in the lending country.

Foreign lending must be accompanied by a willingness to import the produce of the borrower in payment of interest, otherwise the borrower may be forced to default.

PURCHASING POWER PARITY

Behind the balance of payments is the level of prices. If British prices tend to rise relative to world prices this discourages exports and encourages imports, and vice versa. An "unfavourable" balance of payments means a reduced demand for sterling, since there are less British exports to be paid for, and a fall in the exchange value of the pound corresponding to a fall in its internal value. The theory that the rate of exchange (reflecting the external value of the £) tends to move with the home price level (the internal value of the £) is known as the purchasing power parity theory: that is, that the parity between two currencies—the level at which they are in equilibrium—is the rate that represents their relative purchasing powers. If there are $4.87 per £ it is because $4.87 buy in U.S.A. what £1 buys in England. Speaking broadly, in terms of all goods and not of single articles, and allowing for tariffs and transport charges, this is the case.

Exchange rates may, however, be temporarily affected by other factors. Speculators may offer to sell sterling and to buy dollars so that dollars may rise in value and then the speculator sells out his dollars and gets back sterling with a profit. Then there are capital movements or the movements of "hot money," that is, funds belonging to persons and institutions which seek perpetually the "safest" country politically. To counter the influence of these abnormal currency demands and to ensure that the foreign exchange value of sterling moves only gradually and in accordance

with trade factors the Treasury established in 1932 an Exchange Equalization Account operated in conjunction with the Bank of England. The Account is actually a fund of both sterling and gold, totalling £575 millions, the gold being saleable for foreign exchange in any country The gold in the Bank of England was a reserve for the gold in the Account, and since the outbreak of war in September, 1939, the Account holds the whole stock of the country.[1] If there is a sudden demand for sterling the fund borrows pounds by selling Treasury bills on the money market and supplies the sterling required in exchange for the foreign bank deposits offered with which it buys gold from the central bank of the country concerned. If there is a heavy demand for, say, dollars, the fund will sell gold to the American Treasury for dollars, which will then be sold against sterling. The fund, therefore, by supplying either sterling or foreign exchange on demand, can stabilize the value of the pound, though it will not try to prevent changes in the long-term exchange value due to a change in relative prices between this and other countries. There are stabilization funds also in the United States, France, Holland, Belgium and Switzerland which co-operate with the British authorities.

THE GOLD STANDARD

Up to September, 1931, exchange rates were kept stable through the automatic working of the gold standard. When all countries had a fixed relationship between their standard money and gold (in England the pound was 123·27447 grains standard of gold) through (*a*) the price of gold being fixed by law and (*b*) the central bank being obliged to buy and sell unlimited quantities of gold at this price, then all rates of exchange were fixed at the ratio of the gold contents of each currency (the mint pars of exchange). Gold was thus a universal standard but it was subject to the fault that if world gold output rose more rapidly than normally

[1] Details of gold movements between the Account (Treasury) and the Bank were given in the note on the Fiduciary Issue on p. 52.

then the value of gold fell relative to all other goods, so that prices which were measured in terms of gold rose. While if gold output failed to keep pace with growing industrial output then its value rose and prices of commodities in general fell.

Under the international gold standard internal monetary policy was to keep the pound linked to gold at a fixed price and with a rigid exchange value. If home prices rose relative to world prices then they had to be brought back to the world level else the balance of trade became unfavourable and gold had to be shipped to pay for surplus imports. Were no more gold to be available then the price of foreign currency would rise until imports had been discouraged and exports increased But this point of gold exhaustion would not normally be reached since as gold flowed out the monetary authorities restricted bank credit to force prices back to the world level. The home price level was therefore tied to the world price level, with which it had to move, and exchanges were kept stable.

Abandonment of the Gold Standard

The depression of 1929–33 brought with it falling world prices which dragged British prices with them. Falling prices involve cutting costs and wages but it was politically impossible to reduce costs in this country sufficiently to bring home prices into line with world prices. Further in 1931 there were heavy scare withdrawals of gold from this country when it was realized that larger sums were owed abroad in respect of past deficits on the balance of payments than there was gold to cover them. Every foreign holder of bank balances in this country tried to buy gold with his balance in order to take it home, and when the Bank of England was down to its last £120 millions of gold it decided that this was too valuable as a war chest to be let go, so in September, 1931, the Bank refused to sell any more gold and the gold standard was abandoned The price of gold in the open market was henceforth free to move. Great Britain

then pursued an independent monetary policy aiming first at raising prices to restore profits This involved a sharp fall in the exchange value of the pound (counteracted when other countries also followed a price-raising policy) but since then the policy of this country and afterwards of all other countries has been to concentrate on internal policy and to allow the exchanges to fluctuate if home prices varied from foreign.

The old policy was one of rigid exchanges and flexible prices, the present is one of stable prices and flexible exchanges.

Exchange Control

The policy of independent home prices and flexible exchanges involved the setting up of control funds, e.g. the British Exchange Equalization Account to counter speculation, in some countries and of "exchange control" in others. Exchange control enables a country to control its foreign trade. All exporters are obliged to sell the foreign currency they receive to the central bank, which then resells to the importers of such goods as the State desires to import. The German "guns instead of butter" policy was in practice one of reserving the proceeds of German exports for the purchase of armament materials in preference to consumers' goods. An "unfavourable" balance of trade cannot develop since the State will authorize imports only up to the amount of foreign exchange available from exports.

Exchange control was born out of the depression, many countries found they could not meet all their overseas debts, e g. interest payments, on account of a big drop in the value of their exports, so in order to prevent heavy sales of their currency from depreciating it, they "blocked" the bank balances due to foreigners and merely refused to allow them to be offered in exchange for foreign currency. The problem of excess demand for foreign currency was solved by cutting off the demand at source, the foreigners were

left with their funds in the debtor country in which they had to spend their money themselves, since they were not allowed to exchange it for their own currencies. Exchange control is really an alternative to a very heavy depreciation of the exchange value of a currency coupled with the power to control imports

The outbreak of war has involved a degree of exchange control in the belligerent countries. In Great Britain, for instance, the leading currencies can only be dealt in through the Bank of England, which acquires the proceeds of exports and dispenses available currency to pay for imports in order of war importance. The rates of exchange are determined by the Bank.

FURTHER READING

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Report of the Committee on Finance and Industry (*Macmillan Report*) 1931.
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(b) *The Gold Standard and its Future:* T. E. Gregory. (Methuen)
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Practical Banking. H. E. Evitt. (Pitman.)

CHAPTER III

EMPIRE AND WORLD RESOURCES

THE vital role played by mineral products in building up the material side of modern civilization is well known. They are the basis of engineering construction and on them industrial development depends.

With the advent of the Industrial Revolution coal and iron were required in ever-increasing quantities for the steam engine and new machinery. Fortunately, this country was favourably situated in this respect, and it was the contiguous resources of iron ore, coal, and limestone which raised it to the forefront of industrial development last century. Even vaster resources existed in the United States and Western Europe, however, and in time this country's production was surpassed. In the present machine age fuel for engines and metal for tools are the most important factors, and have changed the balance of world power. The growth and operation of our industrial structure have been made possible by the increase in consumption of mineral products.

Since the beginning of this century more metals and minerals have been produced than in all preceding centuries.

Between 1903 and 1913 the world output of iron—the daily bread of all industries—increased 68 per cent, and the following increases were recorded in other metals—

Copper	68 per cent
Zinc	73 ,,
Lead	28 ,,
Tin	17 ,,
Aluminium	875 ,,
Nickel	233 ,,

Following the world trade depression of 1929–33, the output of minerals has resumed its upward path, and tremendous strides in world consumption are still to be

expected, due to further expansion of transport facilities and increasing mechanization in industry and agriculture.

First of all we may inquire what is meant by "resources." They are those mineral deposits, the extraction of which is payable under existing economic conditions. Deposits cannot be extracted if the costs exceed the value of the mineral recoverable. A small fall in price may make quite a difference to the visible reserves, unless the State is prepared for special reasons to cover the loss and, on the other hand, the economic availability of mineral deposits is profoundly affected by improvements in methods of extraction. Recent advances in this direction have brought large masses of ore into the realms of payability. For example, not many years ago the reserves of lead and zinc were comparatively limited, but the differential flotation system showed how to separate lead and zinc sulphides, and reserves went up. Improvements in the extraction of tin, gold and copper (combined, of course, with the large scale on which they are conducted) have also rendered lower grade ores payable. Mechanization has been introduced into every stage of the metallurgical processes. Another science which has helped to increase resources is economic geology—for example, new oil-fields have been developed by geological deduction.

The first thing that strikes one about the world distribution of mineral resources is its erratic nature. For example, as regards copper ore, in 1937 North and South America with 12 per cent of the world population produced 62 per cent of the total output. Some countries have a virtual monopoly in certain metals, e.g. Canada in nickel. Surveys are continually being made by such bodies as the Imperial Institute and the Imperial Mineral Resources Bureau, but the inequality of distribution may be taken as permanent, and in view of increasing world consumption raises a difficult problem for the future, on account of the present militant economic nationalism (see table, p. 85).

Fuels

Coal is, of course, the most important fuel, and the reserves are probably 6000 times the world's annual consumption. They are distributed roughly as follows—

	Per cent
U.S.A.	47·5
U.S.S.R.	15·7
Canada	15·0
China	12·4
Germany	4·7
Great Britain	2·4
Australia	2·0
Africa	Small

The Empire accounts for about 25 per cent of the reserves. The order of output stands as follows: (1) U.S.A., (2) Great Britain, (3) Germany, while as regards the productivity per miner the order is (1) U.S.A., (2) Germany, (3) Great Britain.

Before 1914 Great Britain produced about 30 per cent of the world's output, though the proportion to-day is rather less than 20 per cent. Cheap coal is the keystone of our economic position, as there is no likelihood that water power will replace it for production purposes.

The demand for home industrial consumption may be divided into five groups: public utility companies, iron and steel trades, other industries, engine fuel and coastal shipping.

The export of coal has been fundamental in the development of our mercantile marine. Although competition, fuel economies, and the development of alternative sources of power and of new deposits have reduced this country's shipments, 16 per cent of output is still exported and 70 per cent of output is seaborne.

As there is no cheaper alternative in Great Britain, conservation became imperative, and considerable progress has been made in more efficient carbonization by low-temperature processes and full by-product recovery. There have also been developments in its more economic use in central stations for electric power supply.

It is probable, however, that coal will not be so overwhelmingly important in the future as it was in the nineteenth century.

COAL OUTPUT (million metric tons)[1]

	1929	1937	1938
U S A.	553	448	352
U K.	262	245	232
Germany (Old Reich)	163	185	186
U S S R.	42	123	133
France	54	44	47
Poland	46	36	38
Belgium	27	30	30
World	1,333	1,307	1,225

Although petroleum is an increasingly important fuel, it will probably not serve as a replacer of coal. The world production has only about 3 per cent of the energy of the total coal production.

OIL (million tons)

	1929	1937	1938
U S A.	138 0	172 9	164·1
U.S S R.	14 5	27 8	28 9
Iran	5·5	10·4	10·4
Netherlands East Indies	5 2	7·3	7 4
Rumania	4·8	7·2	6 6
Mexico	6·7	6 9	5·7
World	206 0	280 0	272 0

Although control of about half the world reserves is in British hands, it constitutes a weak link in the Empire's position. There is some oil in Trinidad and Burma, but not much.

Considerable developments have been made in the hydrogenation of coal, but the crux of the question is, will

[1] The figures in this and the tables that follow have been taken from the Statistical Year Book of the League of Nations, 1938–9. The metric ton is the unit of measurement throughout

it pay without Government protection—at least for some time to come? The demand for petroleum will, however, have to be met more and more from resources of shale and coal. Germany and Great Britain have developed hydrogenation most fully, but even in Germany the annual output of oil from coal, which exceeds 1 million tons, was in 1939 barely one-fifth of total consumption.

Water Power

There are inexhaustible resources of water power in the world, but the world's total water power could be economically developed by 60 per cent of the present coal output. Large hydro-electric stations are, however, favoured by their low operating costs, and compete with the best coal-producing centres. The chief sources of water power are U.S.A., U.S.S.R., Canada, Norway, the Balkans, Sweden, Austria, France, Italy and Spain. The British Empire does not stand well in this connection, with the exception of Canada.

Iron and Steel

Over 40 per cent of the world's reserves of iron ore are in the U.S.A., but India has about 11 per cent. Canada has 9 per cent, Great Britain 5·5 per cent, Newfoundland 3·5 per cent and there are reserves in the West Indies. The maximum world output of iron ore has risen to 190 million tons per annum.

To-day the British Empire produces only about 10 per cent of the world's iron ore and 12 per cent of the pig-iron. Yet in 1870 Great Britain produced about 50 per cent of the world's pig-iron output, mainly from the hematite ores on the north-west coast, and no iron ore was imported. The rich ores are, however, approaching exhaustion, and our present iron production is made half from home ores and half from imported ores. About 30 per cent of the ores used come from Spain, Sweden and Morocco. It is cheaper to use

ores from Spain than from Newfoundland; in fact, this question of economy is the reason why only about half of the Empire production of iron is made from its own ores, whilst it could in fact support all its requirements. India is the oldest iron-producing country in the world, and has a considerable export trade, e g. with this country and Japan.

Australia has resources in New South Wales, and could supply its own requirements and those of New Zealand. Canada at present imports iron from the U.S.A. and Great Britain, but is potentially self-supporting. South Africa has also started to develop its own industry.

IRON ORE (metallic content, mn tons)

	1929	1937	1938	1937 Percentage of total
U.S A.	37 6	37·3	28·7	38·1
U S.S R.	4 0	14·0	15 0	15·0
France	18 0	11·5	10·1	11·8
Sweden	7·0	9·1	8·5	9·3
U.K.	4·0	4·3	3·6	4 4
Germany (Old Reich)	2 1	2·8	3·1	2 9
India and Malaya	2 1	2·9	2·9	3·0
Luxembourg	2 3	2·4	1·5	2 5
Algeria	1·1	1 3	1 6	1·3
Spain	3 2	0·5	1·2	0·5
World	90·0	98·0	75·0	—

PIG-IRON (mn tons)

	1929	1937	1938
U.S.A.	43·3	37·7	19·5
Germany[1]	13·2	16·3	18·6
U.S S.R	4·3	14·5	14·7
U.K.	7·7	8·6	6·9
France	10 4	7·9	6 0
World	98 6	104·0	83·0

[1] Including Austria and Sudetenland 1937-8

CRUDE STEEL (mn tons)

	1929	1937	1938
U S A .	57·3	51·4	28 8
Germany .	16·0	20 0	23·2
U S S R . .	5 0	17 8	18·1
U.K .	9·8	13·2	10·6
France . .	9·7	7·9	6 2
World	120·7	135 0	109 0

MANGANESE

Manganese is of vital importance in the production of iron and steel, being used chiefly as spiegeleisen and ferro-manganese. India could supply all the Empire requirements

MANGANESE ORE (thou. tons)

	1929	1937	1937 Percentage of total
U S S R. . . .	650	1,200	40 4
India	505	534	18·0
Gold Coast . . .	217	280	9·4
Union of S Africa . .	4	269	9·1
Brazil . . .	137	115	3 9
Germany . .	203	209	7·0
World . . .	1,952	2,970	—

STEEL ALLOYS

Nickel is principally used in alloy steels and nickel-chromium alloys. The sources of supply are in Canada (over 90 per cent), where the Sudbury nickel-copper ores are the largest deposits in the world, and in New Caledonia. The U.S.A is the biggest producer of the metal.

Chromium ore is mined extensively in the Empire, which is, however, dependent on foreign supplies for the metal. A large part of chrome ore supplies go to Norway and

Sweden for smelting by the cheap hydro-electric power there.

CHROMIUM ORE (thou tons)

	1929	1937	1937 Percentage of total
S Rhodesia .	130	135	22 9
Turkey . .	8	96	16 5
Union of S Africa .	27	76	12·9
U S S R. .	20	100 (estd)	16 9
World . .	299	590	—

Cobalt comes mainly from the silver-cobalt-nickel ores in Ontario, and the Empire is in an independent position as regards this metal.

Tungsten ores are found mainly in China (nearly 50 per cent), Burma, U.S.A., S. America and Australia, and the output of the Empire is probably equal to the demand.

Molybdenum ores come principally from the U.S.A., but there are deposits in Australia, Norway and Canada.

Cadmium ores come principally from the U.S A. (53 per cent in 1937), while other sources are Germany, Canada and Australia.

Antimony is mined mainly in China (36 per cent in 1937) Mexico (24 per cent) and S. America.

NON-FERROUS METALS: COPPER

Copper is the world's second important metal. About one-third of the world's production occurs in the U.S.A. while the Empire makes about 20 per cent. Most of the copper made in the United Kingdom comes from imported ores, regulus and precipitate, and there is a need for more refineries here as about one-half of our copper is imported. Canada and Rhodesia are the chief Empire sources and could supply the Empire.

COPPER ORE (thou tons)

	1929	1937	1937 Percentage of total
U S A . .	905	764	32·5
Chile .	321	413	17·5
N Rhodesia .	6	250	10·5
Canada . .	113	240	10 0
World	1,939	2,348	—

COPPER (SMELTER) (thou tons)

	1929	1937	1938
U.S A. . . .	999	820	570
Chile .	303	396	338
Canada . .	73	210	223
N. Rhodesia	6	212	213
Belgian Congo .	137	150	124
World .	1,905	2,338	2,040

ZINC

Some of the principal sources of zinc ores are the U.S A., Australia, Canada and Silesia. The biggest producers are the U S A , Belgium and Germany. The Broken Hill mines are the most important in the British Empire, but ores are

ZINC ORE (thou tons)

	1929	1937	1937 Percentage of total
U S A .	657	568	30·6
Germany . .	143	166	8 9
Other European	310	300	16 2
Australia	157	207	11 1
Canada . . .	90	168	9·1
Mexico . . .	174	154	8·3
World . .	1,713	1,856	—

also mined in British Columbia, Burma, Rhodesia and Tasmania. The output should supply the Empire consumption, but our smelting capacity is insufficient. Before the war of 1914 almost all the spelter used in this country came from imported ores. The principal use of zinc is for galvanized sheets, which account for about 60 per cent. Brass, bronze and anti-friction metals consume about 25 per cent.

SPELTER (SMELTER) (thou. tons)

	1929	1937	1938
U.S A	567	505	406
Belgium	198	218	210
Germany	102	163	195
Canada	78	144	156
Poland	169	107	107
Australia	53	71	70
U.K	59	63	56
World	1,450	1,623	1,580

LEAD

The U.S.A. has the largest resources of lead ores, but Australia is favourably endowed, and British ores amount to approximately one-quarter of the world's output. A good deal is, however, exported so that only about two-thirds of

LEAD ORE (thou tons)

	1929	1937	1937 Percentage of total
U.S A	590	422	24·7
Australia	197	250	14·7
Canada	148	187	11·0
Mexico	248	218	12 8
Burma	104	93	5 4
Germany	61	79	4·6
Yugoslavia	15	71	4 2
Other European	223	150	8·8
World	1,715	1,705	—

the Empire's requirements are supplied. Developments are occurring, however, in Burma and Rhodesia.

The Empire produces about 30 per cent of the world's pig lead, but cannot fill all our requirements, and smelting capacity needs to be increased.

LEAD (SMELTER) (thou tons)

	1929	1937	1938
USA . . .	702	424	348
Australia . .	180	232	227
Mexico . .	230	225	207
Canada . . .	138	181	182
Germany .	98	162	185 (includ Austria)
Spain .	143	30	35
World . . .	1,819	1,689	1,640

TIN

Foreign countries are dependent for more than half their supply on British tin, in fact ore production in the British Empire is half the world's output In addition to British Malaya, there are ores in Australia, Nigeria and South Africa. The metal is chiefly applied to tin plates, but thousands of tons go annually into bearing metals.

TIN ORE (thou. tons)

	1929	1937	1937 Percentage of total
British Malaya	70	79	37·4
Bolivia . . .	47	25	11·8
Netherlands E Indies	31	40	19 0
Siam . . .	11	16	7 6
China	7	11	5·2
Nigeria . . .	11	11	5·2
World . .	191	211	—

TIN (SMELTER) (thou tons)

	1929	1937	1938
British Malaya	107	97	66
Netherlands E Indies and Netherlands	14	41	34
U K. . . .	56	34	36
World . . .	192	200	163

ALUMINIUM

An outstanding feature of engineering development is the increasing use of light metals. Unfortunately little bauxite is found in the British Empire, although there are deposits in various parts.

The Empire mainly uses imported ores, but does not produce one-quarter of its requirements. Other sources and methods of production need investigation. France produces the metal cheaply and it is imported here.

In normal times four-fifths of the aluminium used in the United Kingdom is imported in the form of metal, chiefly from Canada, while the remainder is produced from imported bauxite. In 1937 4 per cent of the world's output of the metal was produced in this country.

BAUXITE (thou. tons)

	1929	1937	1937 Percentage of total
France . .	666	688	18
Hungary	389	533	14
U S.A. . .	372	427	11
Dutch Guiana	210	392	10
British Guiana .	220	367	9
Italy .	193	387	10
World . . .	2,190	3,890	—

Yugoslavia, Greece, Germany and the Netherlands East Indies are all considerable producers.

ALUMINIUM (SMELTER) (thou. ton)

	1929	1937	1938
U S A . . .	103	133	130
Germany .	33	128	160
Canada . .	39	42	64
U S S R .	—	45	49
France . . .	29	35	45
World . .	273	493	582

RUBBER (thou tons)

	1929	1937	1938
British Malaya .	464	477	378
Netherlands E. Indies	259	439	303
Ceylon . .	82	72	60
World . . .	822	1,158	919

EMPIRE AND WORLD PRODUCTION IN 1937 (thou. tons)

	ORE (metallic content)			METAL		
	World	Empire	Empire as Percentage of World	World	Empire	Empire as Percentage of World
Iron .	98,000	10,000	10	104,000	12,500	12
Copper	2,348	583	25	2,338	465	20
Lead	1,705	601	35	1,689	504	30
Zinc .	1,856	526	28	1,623	292	18
Tin .	211	102	48	200	134	67
Aluminium .	3,890	404	10	493	61	12

Prior to 1914 the U.S.A. dominated the base-metal markets of the world, with Germany second, but the control of the latter was of a financial nature, as her resources, like our own, were approaching exhaustion. Belgium, whilst only possessing coal, was in a unique position in the metallurgical industry as, owing to her skill and enterprise, she built up a strong industry in copper and zinc. Three-quarters of our spelter came from Belgium, also half the cobalt and half the radium of the world. The copper, cobalt and radium mines of the Union Minière in the Belgian

Congo were discovered by British pioneers. With the exception of tin the smelting and refining of non-ferrous metals in Great Britain could be considerably expanded; in fact, even if iron and steel are included, our metal industry is not large.

The Position of the Empire

The British Empire is the largest and most wealthy in the world, producing over 90 per cent of the world's nickel, one-half of its gold, over half its wool and rubber, over 35 per cent of its lead, 40 per cent of its tin, one-third of its manganese and chrome, 99 per cent of its jute, and owning 30 per cent of its shipping

Its forest resources are immense, but it is doubtful if they are adequate, and greater attention is required to be given to conservation of timber and forest management.

The U S.A. produces about one-third of the world's steel, 25 per cent of its lead, 30 per cent of its zinc, 35 per cent of its copper, and 60 per cent of its petroleum. It does not, however, approach as nearly to a self-contained unit as the British Empire. Russia with its vast developing resources spread over one-sixth of the earth's surface is also largely self-sufficient.

A matter of practical importance in face of world competition is to ascertain the present status and potential development of the Empire in mineral resources.

Resources must be distinguished as to whether they are within a country's borders or under its political and commercial control.

No country alone attains self-sufficiency, but the British Empire is potentially unique. In this respect, of the twenty-eight leading metals and minerals it has an abundance of twenty-one, can meet its own needs as regards two, is partially dependent for one, and dependent on foreign resources for four.

Of the twenty-eight commodities referred to, coal, iron and petroleum are the three giants; their production is four times as large as the other twenty-five put together. The

annual value of the world's coal output is about equal to that of all other minerals put together, and with petroleum and iron ore the value is about 80 per cent of the total.

The United Kingdom is dependent for twenty out of the twenty-eight metals and minerals, and the Dominions individually do not rate very high.

In considering the relation between production and requirements we may divide minerals and engineering materials into four categories—

1. Those that the rest of the world imports largely from the Empire, to which class belong asbestos, jute, gold, mica, nickel and rubber.

2. Those of which the Empire has ample supplies and an exportable surplus, e.g. coal, fluorspar, graphite, lead, manganese.

3. Those for which the Empire depends in some measure on foreign countries, e.g. bauxite, copper, iron ore, tungsten.

4. Those for which the Empire depends almost entirely on foreign countries, e.g. petroleum, mercury, sulphur.

The following table shows the distribution of the world's mineral production—

DISTRIBUTION OF WORLD OUTPUT OF ESSENTIAL RAW MATERIALS. 1937–8 (1938 WHERE AVAILABLE)

Expressed as a percentage of World Output

Commodities	British Empire and Egypt	French Empire	Dutch Empire	U.S.A. and Dependencies	U.S.S.R.	Rest of World
Coal .	23·8	3·6	1·2	34·3	9·4	27·7
Petroleum .	2·6	nil	2·7	60·3	10·6	23·8
Iron Ore .	10·3	13·6	nil	38·4	15	22·7
Copper Ore .	24·8	nil	nil	32·5	3·9	38·8
Copper . .	19·9	nil	nil	35·1	3·9	41·1
Nickel . .	90·5	nil	nil	0·2	nil	9·3
Tin Ore .	40·0	1·1	17·5	nil	nil	41·4
Lead Ore .	35·2	2·2	nil	24·7	3·3	34·6
Lead .	29·9	3·7	nil	25·1	3·2	38·1
Zinc Ore	28·3	0·9	nil	30·6	3·8	36·4
Zinc	18·0	3·7	1·5	31·1	4·3	41·4
Chrome Ore	41·2	4·1	nil	6·0	16·9	31·8
Sulphur	nil	nil	0·4	81·9	nil	17·7
Manganese Ore	38·6	1·2	0·2	0·8	40·4	18·8
Pyrites .	9·1	1·7	nil	5·8	7·4	76·0
Bauxite .	10·4	17·9	15·2	11·0	6·4	39·1
Potash .	0·6	16·1	nil	8·3	7·6	67·4
Gold .	56·8	0·9	0·2	13·8	14·8	13·5
Silver	17·4	0·3	0·2	26·5	1·8	53·8

of resources and trade, extended to include other areas which wish to co-operate. If there is to be co-operation in trade there could be no better field than within the Empire, yet even here the rivalry of private interests leads to a restriction of exchange and development.

FURTHER READING

(a) *Principles of Economic Geography*: R. N. Rudmose Brown. (Pitman.)
The Mineral Industry of the British Empire. (H.M. Stationery Office.)

(b) *Statistical Year Book of the League of Nations.* (Annual.)
The Mineral Industry: Its Statistics, Technology and Trade: G. A. Rouch. (McGraw-Hill.)
Annual Statement of the Trade of the U.K. (H.M. Stationery Office.)

CHAPTER IV

INDUSTRIAL EVOLUTION

THE value of an industrial perspective of history is that it gives a scientific attitude towards present conditions and problems. It helps us to understand that developments in production have not taken place in a haphazard manner, but that they have depended upon the economic organization of society. We can observe the working out of a connected historical process, study the forces that have moulded our productive society into its present form and see whither those forces are directing it.

The greatest inventors of all time discovered fire, agriculture, pottery, and the wheel, but their names are not known. For thousands of years paved roads and long-distance water supply have been constructed. Babylonian mathematical astronomy compared with that of less than a hundred years ago. We have only to remember the Great Pyramid, the Roman aqueducts and roads, to be struck by the ability of the ancient constructors, and how well and truly they built. Both the Greeks and the Romans worked and used iron, and the principles underlying ancient tools did not differ from those of the present day. Mass production began with printing about the middle of the fifteenth century, at which time the possibilities of experimental investigation were being appreciated in Western Europe. A century later Galileo had invented the telescope and Leeuwenhoek the microscope, but the greatest scientists of the middle ages were Leonardo da Vinci (1452–1519), the founder of modern mechanical science, and Georgius Agricola (1494–1533), the father of metallurgical science. It may be said that to some race or another in the old days every form of engineering was known except those requiring the application of generated forces. In the

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early engineering achievements, time and labour were not taken into account. This was because the early civilizations were based on slave labour, and in a slave society there is no incentive to economize physical effort. The characteristic of the industrial revolution will be seen to be the application of non-human power to machinery. The new motive power in coal enabled machinery to be designed on a larger scale. Modern science was developing and giving man greater control over the resources of nature. The freeing of mankind from serfdom and the introduction of wage labour gave an impetus to methods of saving labour in the search for profit, but with the solving of problems of production new social problems have inevitably arisen.

The Historical Process

Primitive society was communistic, production and distribution being collective. This was ultimately succeeded by slave society in which a dominant class held the land, the main means of production, and obliged a subject class to work it for them. Feudal society of the Europe of a thousand years ago represented a further development, for though the serfs who worked the land were not its owners they possessed personal rights which the slave lacked. The serfs had, moreover, the right to cultivate land for themselves in addition to working for their overlord. The breakdown of feudalism was followed by the wage system under which, though the worker still does not own the means of production, land or factories, he has freedom of movement and of bargaining with his employer. He has, however, no *right* to work certain land or machinery and he may therefore become unemployed, a state impossible in feudal society.

Feudal industry was organized on guild lines, each industry forming its own guild or corporation, embracing both masters and workmen. The guilds, however, were designed to serve local communities and their restrictive regulations made them incapable of adaptation to the needs of growing

trade and of exchanges for profit. In the fourteenth and fifteenth centuries they began to decline, and the domestic system took their place. Under this merchants brought raw materials to the homes of workers from whom they later collected the finished work.

The invention of power machinery necessitated the grouping of the workers in factories instead of in their homes, hence arose in the eighteenth century the factory system which transformed England from an agricultural to an industrial country. In the eighteenth century, too, the commercialization of agriculture, which had begun in the fifteenth century with the enclosure of the manorial open fields for sheep-rearing, swept away the last traces of the feudal system and made possible an agricultural revolution which, while greatly increasing production on the one hand, on the other hand "released"—if that term can be used for the dispossession of peasantry who for generations had tilled their own land—labour from the villages to work in the new factories.

Great Britain the Pioneer

The reasons for the Industrial Revolution first occurring in Great Britain are not far to seek. In the eighteenth century there was a relatively sparse though free population living in political security. There existed an accumulation of monetary capital, an essential preliminary to the production of industrial capital goods, as a result of the trade expansion of the previous three centuries in which this country had already played an especially prominent part. Our manufacturers were developing large and increasing markets, to which they had easy access on account of the favourable geographical position of the country and the growth of our mercantile strength. They already possessed a training in large-scale business for overseas markets. The coal and iron fields were favourably situated near together and to the coast. Commerce had already made London the leading financial centre of the world (the Bank of

England had been formed in 1694), and its position became further strengthened with the development of large-scale manufacture.

These factors, cumulative in effect, enabled this country to become the pioneer of a new industrial technique, and gave it a long start over competitive nations. Other countries, however, were not long in profiting by her discoveries and inventions, and adopting her methods, being thus saved the cost of much experimentation and enabled to select or reject according to the requirements of their own special conditions.

Prior Industrial Conditions

The Industrial Revolution involved the invention and adaptation of machinery to almost every industry—not simultaneously, of course, but gradually and over a period as one trade hinged on another—and the application of steam power to drive collections of this new machinery under one roof. It included a revolution in transport, first in the construction of roads and canals, and subsequently with the introduction of railways and steamships, thus facilitating and considerably cheapening the transport of heavy goods. It redistributed the population, and its highly augmented productiveness gave rise to a new colonial era, since raw materials had to be acquired and markets found. The expanding population sought also economic freedom in overseas settlement.

The effects of the introduction of machinery and the factory system may be more clearly appreciated from a short consideration of the industrial condition of this country prior to the middle of the eighteenth century. A large portion of the population was of the yeoman class, spinning and weaving being carried on as domestic trades to increase the family subsistence, by methods which had not changed fundamentally for centuries. The woollen trade was still the principal industry.

As regards the manufacture of iron and steel, the

CHART OF INDUSTRIAL DEVELOPMENT

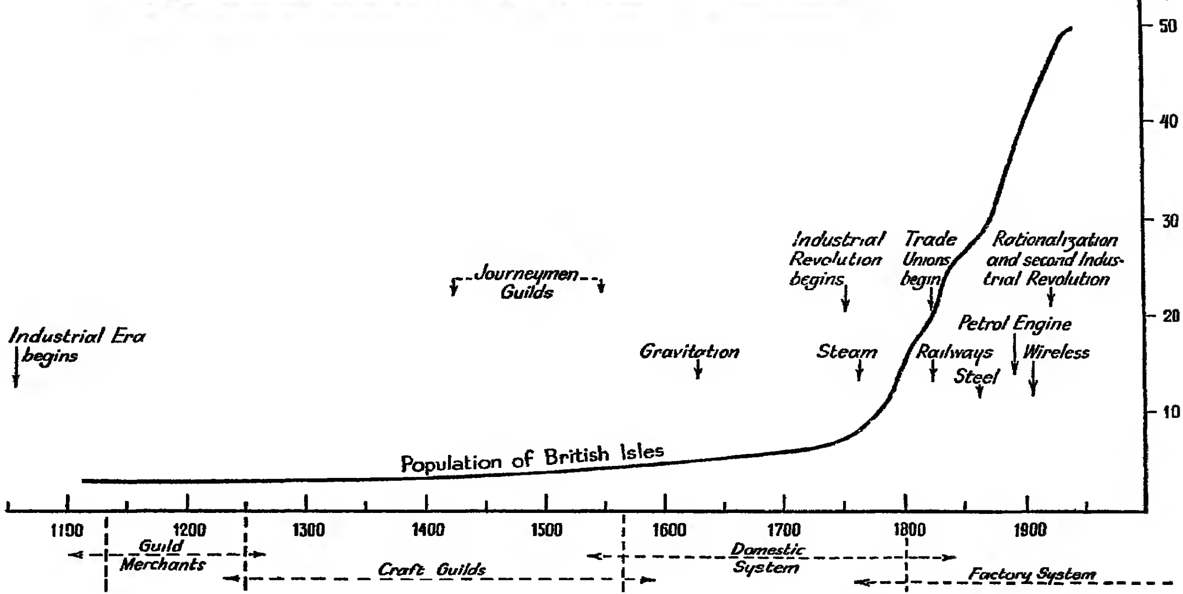

FIG. 2

development of which may be said to determine engineering progress, the English industry had not been as successful or advanced as in some foreign countries, and steel had been imported from the Continent even before the developments there in cast iron. In the sixteenth and seventeenth centuries the industry had been depressed owing to the shortage of wood fuel, and the modern iron industry cannot be said to have commenced until the time of the Darbys—father and son—who early in the eighteenth century reintroduced Dud Dudley's invention of smelting iron with coal and coke fuels. This marked the beginning of the displacement of iron smelting from woodlands to the coalfields, just as the use by the younger Darby of "fire engines" to increase the blowing power required for his blast furnaces marked the beginning of the end of water power for this purpose. It may also be noted that the production of steel by the cementation process had already become established in and around Sheffield when in 1740 Huntsman invented his process for crucible steel, thus enabling the production of better tools and implements. The industry received a great stimulus, and the greater quantities of iron produced at lower cost rendered possible the mechanical developments from English leadership in invention.

The advent of the steam engine was largely due to the need felt for more powerful pumps in mines and collieries. The ideas of the pioneers, Papin and Savery, were combined by Newcomen, whose engine was very wasteful of fuel as the cylinder itself was cooled, and improvements occurred largely from accidental causes, e.g. the laziness of an attendant seeking means of lessening his work, but it was left to James Watt to devise the separation of the cold condenser from the hot steam cylinder, and so through a series of inventions to achieve a practical success which, perhaps more than any other factor, contributed to the transformation and industrialization of the country.

In the construction of docks and harbours little had been

done. Piers were made of unhewn stone, but by the end of the seventeenth century oak piles were used to hold the rocks in position. In the eighteenth century, at Bristol, the second port in the country, the ships used to lie on the mud. Whilst the lighting of the coasts had been organized in the time of Henry VII, it was not until 1700 that the first Eddystone lighthouse was built. It lasted three years.

Although it was clearly realized by the seventeenth century that the development of manufactures depends on the efficiency of transport, the facilities for conveyance of goods up to the time we are considering can only be described as crude. The roads, which had fallen into disrepair after the leaving of the Romans, remained in much the same condition for a thousand years. Though an Act was passed in 1663 authorizing the construction of turnpike roads, they were mainly earthen tracks, and we find the roads from London to Cornwall described in 1752 as "what God left them after the flood." In 1678 a journey by coach from Edinburgh to Glasgow—a distance of 44 miles—took six days. In 1750 it still took 36 hours.

As regards bridges, the rate of progress may be indicated by the following: the first stone bridge over the Thames was built in 1176; the second, which was at Westminster, was not started till 1738.

Although by 1677 Yarranton was advising and writing on how to make rivers navigable, it was not until the next century that canal construction began on scientific lines, the pioneer canal being that from Sankey Brook to the Mersey, built to fill the lack of communications felt by Liverpool, especially for the transport of coal and salt.

With the exchange of goods limited to those that could be transported by the roads, rivers, and canals described, and internationally by sailing boats, it is readily understood why economic development was slow, and it may be remarked that the population of England only increased as follows: in 1600, 4,800,000: 1700, 6,000,000; 1800,

8,000,000. In the next century it quadrupled. Considered as a continuing process, the Industrial Revolution brought about a sixfold increase in population and caused the investment of enormous amounts of capital in industry, on which the living of most people now depends.

Rise of the Factory System

Whilst the Industrial Revolution was based on the scientific inventions of the age, we must not overlook a no less important non-scientific invention, namely, how to organize labour on a large scale in factories. It must not, however, be thought that factories were unknown before the Industrial Revolution. Army clothing was made to contract in factories belonging to Jack of Newbury as long ago as the beginning of the fifteenth century, and printing works constituted a kind of factory organization, but the power was supplied by animals or human beings, and the work-places differed greatly as regards hygienic conditions from modern factories. As early as 1715, however, power was used in the operation known as throwing silk.

Nevertheless, up to the Industrial Revolution, factories were the exception rather than the characteristic unit of production. The marshalling of bodies of men as minders or operators of power-driven machines, so that each individual became virtually a mere cog in a human machine, with no direct interest in the previous history or ultimate destination of the product being transformed, was a novel development.

Social Effects of the Industrial Revolution

Among the economic effects of the Industrial Revolution we have noted the rise of the mining and manufacturing areas, with a marked tendency to increase of urban populations. The production of wealth increased rapidly. The wealth of the country has been estimated as £300,000,000 in 1680, of which about one-third was fixed and trading capital.

In 1800 the capital of the country was £1,760,000,000,[1] that invested in land having sunk from two-thirds to less than one-half. The population, which was practically stationary between 1660 and 1760, not only grew enormously but was redistributed. The eastern and south-western districts declined, whilst the North and Midlands, the Clyde and South Wales became preponderatingly industrial. When we come to consider the social effects, we find a number of pronounced advantages combined with several immediate disadvantages. As regards the former, there resulted a separation of the home from the work-place, regulation of children's work, better sanitary and hygienic conditions, more regular hours, more openings for workers and the power of combination, greater efficiency with a cheapening of production which raised the standard of living, and a development of the export market for British goods.

The Economic Position of Labour

On the other hand, the dawn of the factory system was accompanied by many evils. The coming of machinery created a new industrial class, a class of operatives divorced from their means of production, from interest in their tools, the control of their work, and the final product. The workman lost his independence and was engaged often on monotonous work under subjection to foremen. He possessed little or no economic freedom, as owing to the enforcement of the Corn Laws he had to spend the greater part of his wages on bread. The individual skill of the workman became of less importance, as owing to the use of machinery the acquiring and transfer of skill became much more rapid. Machinery was not introduced without considerable opposition from labour, on whom the change and dislocation bore heavily. The Luddites, who tried to break up textile machinery, did not understand that the cause of their misery was not the machine itself, for a spinner owning his own jenny was not worse but better off as

[1] One-ninth of its level to-day.

a result of the increased productiveness of his machine. The cause of distress lay in the fact that the workman did not own his machine but depended for employment on someone who did, while the latter dispensed with labour as he mechanized his mill.

A vast amount of temporary unemployment was created by the Industrial Revolution, which also initiated an era of industrial crises with fluctuations in employment and output. The profitability of machine production led gradually to an absorption of the labour displaced from hand crafts and total employment and output rose rapidly over the nineteenth century.

The bettering of the conditions of labour came about ultimately as a result of pressure on the part of labour itself, particularly through the growth of labour organization in the trade union movement, which was able to take advantage of the antagonisms between Tory landowners and Whig industrialists to get many beneficial measures passed relating to restrictions on the labour of women and children, compulsory holidays, minimum hours in certain industries, the fencing of dangerous machinery, and so on.

The first period of reforms is covered roughly by the second quarter of the nineteenth century. It coincided with the repeal of many restrictions, viz. on trade unions, emigration, shipping, the export of machinery, with the coming of free trade, and with the rise of joint-stock banks. On the whole, therefore, although a certain amount of protection was afforded to workpeople, it was rather of the nature of an irreducible minimum. Individualism was rampant and there certainly seemed justification for Adam Smith's doctrine of no restriction on trade, for England was indeed bidding fair to become the workshop of the world.

The reaction from *laissez-faire* came about in the industrial sphere on account of the growth of competition from countries which had benefited from this country's costly experiments. Monopoly grew up at home and demanded reinforcement by tariffs against foreign competition. In

the social sphere the trade union movement grew to become a political power and finally to support its own political party. As a result the last quarter of the nineteenth century and the years before 1914 witnessed a new era of labour legislation, particularly with regard to the employment of women, young persons and children. Schemes for insurance against sickness and unemployment were introduced, a system of general education was built up and finally attention was given to commercial and technical education.

The Development of Machinery

The introduction of machinery actually commenced in the textile industries. The prohibition of imports of cotton goods from India, a scarcity of hands, and the invention, in 1733, of Kay's flying shuttle, which doubled the output of the weaver, created a famine in yarns. It was to meet this need that Hargreaves's spinning jenny was introduced about 1764. The yarns, however, were used only for wefts. In employing water power for spinning in 1768, Arkwright's water frame produced yarns strong enough for warps. Crompton, about 1775, combined the two machines in his mule, making possible the production of pure cotton goods. As regards the organization of the industry, from work on hand-machines in the home it passed to hand-work on a collection of machines in one building, and then to the application of power to this collection, which at first was water-driven, i.e. after the introduction of Cartwright's power loom in 1789, which enabled weaving to keep pace with the mechanical process of spinning. Machinery consolidated scattered workers, and the application of steam permitted a large increase in the size of factories. Whitney's cotton gin invented in 1794 made American cotton cleaner and more abundant. The new cotton industry was soon placed ahead of the woollen, formerly the staple trade.

The interaction between engineering and textiles is not hard to trace. Cylinders for block printing were introduced

about 1785. The work of Horrocks in substituting iron for wood looms, and that of other inventors, made power looms a practical success by the end of the Napoleonic Wars. Lace-making machinery was invented in 1808 by Heathcoat. Between 1820 and 1830 worsted power-weaving and the wet spinning of flax by machinery were introduced. About the middle of the century woollen and flax power-weaving and hosiery machines were being developed. Inventions in chemical engineering for dealing with bleaching and dyeing operations also contributed to the development of the textile industries, the application of machinery to which not only greatly increased, but cheapened production, and built up one of the chief mainstays of the country's industrial wealth.

Progress in the Metal Industries

The importance of developments in the metal industries in rendering possible the achievements of the Industrial Revolution is apt to be overlooked. We have seen that the introduction of coal and coke for smelting cast iron gave a tremendous stimulus to the industry, owing to the plentifulness of fuel available. The use of coke necessitated considerably higher blast pressures, to meet which Smeaton invented the reciprocating blowing engine, which was first used at the Carron Iron Works in Scotland.

The only forms of iron available for engineering purposes were cast iron and wrought iron. Production of the latter was facilitated by the inventions of Cort, who had works in Surrey Street, London. In 1783 he introduced grooved rolls, and in 1784 invented the reverberatory puddling furnace. Before the Industrial Revolution, wood, brass, and lead were largely used for the construction of machinery, but owing to the increasing cheapness of iron due to the inventions mentioned and its suitability for engineering purposes, the demand rapidly increased from the beginning of the nineteenth century. The engineering success of Boulton and Watt was largely due to the ability of the

iron master, John Wilkinson, and his improved machining methods, particularly for boring cylinders. The use of cast iron revolutionized the type of bridge that was constructed. The rapid development of the industry was responsible for the remarkable growth of railways between 1825 and 1846 upon which it in turn depended.

The hot blast process for cast iron was invented by Neilson in 1829, and immediately facilitated the smelting of the Scottish blackband ironstone. By 1830 the tendency to use iron for shipbuilding had become a practice, and in 1837 Nasmyth invented the steam hammer, which revolutionized the production of forgings. Wrought iron was used for rails, boiler plates, and ship plates until the invention of the process for making mild steel, which is associated with the name of Bessemer in this country and Kelly in America.

The organization of the industry did not change as in the textile industry; it had been capitalistic for a long time, as a considerable initial capital expenditure was essential.

The Science of Measurement

Lord Kelvin said that to be able to measure is the first step towards real scientific knowledge of a subject. The social and economic benefits of standards of measurement need no emphasis. Without them commercial intercourse would be impossible. The determination of standards of length is of vital importance in engineering, and the basis on which it rests is the science of fine measurement.

When the Industrial Revolution had begun, the lack of accuracy in machine work may be illustrated by the fact that the first iron cylinders for Watt's steam engines were bored one half-inch out of truth. Interchangeability of parts was impossible. Wilkinson's boring machine with the bar right through the cylinder was invented in 1774, and the vertical borer in 1795, and pole lathes were in use in 1800. In 1750 the title of engineer was unknown in the

English vocabulary. The term was in fact "invented" by Smeaton.

We have seen that the progress of the factory system was at first slow. With the increase and cheapening of the production of iron and steel and in response to the growing demand for machinery came a gradual expansion in the use of machine tools. The turning-point was reached, and a new type of engineer arose. The improved tools considerably cheapened engineering processes. The first effective slide rest and lead-screw for lathes was built in 1797 by Henry Maudslay, who has been called the father of the modern machine tool. It is said that in 1800 there were not more than three good machine shops in England. After 1825 the number increased rapidly. To the American, Eli Whitney, who built his first milling machine, a rotary file, in 1818, must be given credit for some of the earliest work on interchangeability in manufacture. About 1830 the method of producing a true plane by means of a straight edge and scraper was devised by Muir, and the planing machine was introduced by Roberts. A greater precision in products depending on a sliding motion was thus possible.

Before Whitworth's classical work on screw threads, there was no interchangeability of screws. He standardized the type of thread and diameter of screws. He improved the guide screw of lathes to serve as a standard of manufacture. By Whitworth's application of the true plane, the slide and the screw, machines were able to work with an accuracy and economy hitherto unknown, and England was enabled to lead the world in the production of machine tools for the best part of the nineteenth century. It must be admitted, however, that at the end of last century, due to the work of such pioneers as Norton and Pratt and Whitney, leadership in this direction passed to the United States. There the large, assured internal market has favoured mass production, and automatic machinery has been developed to an unparalleled extent.

The Revolution in Transport

An integral part of the Industrial Revolution was the improvement of the means and modes of transportation. The development of transport has been aimed at reducing the transit time between any two points, but since an increase in speed is usually, though not always, provided at increased cost, traffic is not necessarily transferred to the new form of transport. It depends on the urgency, limitation in the size of the carrying unit, and what the traffic can bear.

The four principal phases of achievement were betterment of roads, construction of canals, inauguration of railway construction, and application of steam power to river and ocean navigation. The development of air transport belongs to the second industrial revolution and is illustrative of the fact that speed is sometimes provided at a price greater than the price at which it can be sold, i.e. some form of subsidy makes up the difference between the rate and the actual cost of conveyance.

The Economic Importance of Canals

Trade depends on moving commodities rapidly and at low cost. The economic need for improved transport facilities to cope with the masses of raw materials and finished goods was responsible for the development of canals. The chief essential for the establishment of factories and the growth of manufactures was and still is cheap coal, and the canals projected as necessities in providing transport were responsible for the development of the Industrial Revolution until the coming of the railways. Their immediate effect as compared with road transport was to reduce the cost of carriage to roughly one-quarter. They enabled food and fuel supplies to be assured to the increasing aggregation of the population in towns, e.g. the Bridgewater Canal to Manchester connected up industrial areas, and assisted the development of ports and our overseas trade.

In the early days of the Industrial Revolution, Josiah Wedgwood was making the inventions and improvements in artistic pottery for which he is so widely famed. Recognizing the economic importance of canals, he gave unqualified support to their construction. The Grand Junction Canal undoubtedly stimulated the development of the Potteries among other districts in the Midlands. In 1838 no place in the country was more than fifteen miles from a canal or river.

The engineering achievements in the construction of canals with tunnels and aqueducts were undoubtedly of a high order. Whilst the contributions of individual engineers cannot be dealt with here, the names of Telford, Smeaton, and Rennie will always stand out in the front rank. The Manchester Ship Canal, constructed at a later date, may be mentioned as an example, not only of engineering achievement, but of economic assistance rendered to manufacturers in reduction of rates of carriage and elimination of transhipment charges, and of incentive to the establishment of new industries.

The decline of canals before the advancing competition of railways and coasting steamers is well known, but it may be mentioned that the canal owners did not utilize the advances in mechanical science, and made few, if any, efforts to attract custom; in fact, though the comparison is not quite fair, they have not been as progressive in this direction as the owners of canals on the Continent. It is to their credit, however, that they initiated the revolution in commercial staples by facilitating the exchange of bulky and heavy commodities, resulting in an increase of the trading and shopkeeping classes, and canals were the forerunners of the commercial reorganization caused by mechanical transport.

Docks, Harbours and Wharves

There is no need to stress the economic effect of good docks and wharfage. In particular the trade and prosperity

of London have long been recognized to be dependent thereon. In 1660 London had a twelve-acre basin in the Howland Great Dock and a century later Liverpool had thirteen acres of docks. It was in 1798 that Rennie was first consulted with regard to London Docks, and in the next few years the West India Docks, the East India Docks, and the Commercial Docks were constructed. This engineer also suggested the use of steam cranes on tramlines for accelerating loading or unloading. The impetus given to trade by dock construction is too well known for examples to be multiplied, but Liverpool, Glasgow, Tyneside, and Immingham may be mentioned, the latter having been designed for the export of coal and the import of iron.

The originality of Smeaton in the design and construction of lighthouses opened a new era of security for shipping and stimulated the building of larger vessels for the more economical transport of cargo.

Roads and Bridges

The Roman roads were not equalled for a thousand years. Although the turnpike trusts date from the end of the seventeenth century, no new principles of construction were introduced until the beginning of the nineteenth.

A new era of road construction was inaugurated by the work of Metcalf, Telford, and Macadam, the roads being formed with proper foundations and strong, smooth, and solid surfaces.

This reacted favourably on the metal industries, adding to the increasing demand for tools and equipment. The increasing traffic demanded more and stronger bridges. The first cast-iron bridge in England was constructed in 1779 by Abraham Darby, to whom reference has been made above. As the Industrial Revolution advanced, Smeaton, Rennie, Paine, Telford, and others improved the designs and methods of bridge construction. Subsequently Stephenson himself did pioneer work in the erection of railway bridges.

The use of cast iron and wrought iron has given way to that of mild or slightly alloyed steel, and of recent years reinforced concrete has become a competitor for bridge construction. Advances in other directions have also contributed to this work; for example, steam pile drivers, the use of compressed air, and improved lifting gear.

The Development of Steam Power

The invention of the steam engine was the pivotal point in the history of industry. Following on the work of Savery and Papin, Newcomen's invention of the atmospheric beam engine was the greatest single act of synthesis in the history of the steam engine. It may be noted that power production gave birth to mechanical engineering. The steam engine led to the invention of boring and planing machines, the working of masses of metal, and the introduction of accuracy into machinery. The age of steam was inaugurated by the work of James Watt in 1763, whose first engine was made at the Soho Works for Wilkinson. Industry dates from his improvements in the steam engine. Power could be produced anywhere that fuel was available. No mechanical device has wrought greater changes in the economy of the world. Among Watt's inventions may be noted the separate condenser, the double-acting engine (1782), the principle of cut-off, the throttle valve, centrifugal governor, parallel motion, and the indicator. The slide valve was invented by his assistant, Murdock, and compound expansion by Hornblower and Woolf. Neither the steam engine nor the automatic machinery to which it gave rise could have been developed without the metal iron.

It will be realized that the generation of steam power was fundamental to the industrial development which we are considering. Practice, however, outran theory. Knowledge of the theory of steam was in Watt's time rudimentary. Carnot had written his brilliant essay on the motive power of heat, but it was not understood, and the early steam engineers had little idea of what they were really

doing. Technical practice began and continued on empirical lines. The theoretical side of steam engineering could not have advanced to its present position without the important contributions to thermodynamics of Joule, Kelvin, Rankine, and Clausius.

Steam was responsible for industrial development in the nineteenth century. Steam is still the dominant factor in power production, though the distribution and application of power is now mainly by means of electricity.

The Coming of the Railways

Rails were employed as a track for wagons long before the invention of the steam locomotive. They were first made of wood, subsequently of cast iron, then wrought iron, cast iron being used at Coalbrookdale in 1767. The flange was cast on the rail until the suggestion, by W. Jessop, in 1788, to cast it on the wheel itself, though flanged wooden wheels had long been known. Flanged iron wheels were used for the first time on Losh and Stephenson's fish-bellied rail in 1816.

The necessity of rapid transportation for increasing production brought the steam locomotive into being. Murdock constructed a model locomotive in 1784, but his pupil, Trevithick, built the first practical locomotive in 1802, by his great achievement of the introduction of the high-pressure engine. The contribution of Matthew Murray, of Leeds, towards making locomotive transportation on rails commercially successful should not be overlooked. George Stephenson's first locomotive ran in 1814. The first locomotives were used at collieries, to the success of which Matthew Murray's work largely contributed. The economic importance of cheap transport of coal and other commodities, which, as we have seen, canals did much to foster, directed men's interest to railways, as they were more adaptable. Stephenson invented the use of the chimney blast as suction draught, and his "Rocket" determined the general trend of design.

The coming of the railways caused a great increase in employment, and stimulated the iron and steel trades and the growth of large businesses. The construction of railways caused a tremendous increase of population in certain localities; the Stockton and Darlington railway, for example, virtually created Middlesbrough. The transport of goods was not only accelerated but cheapened, and railway construction gave employment to a large number of men at a difficult period. The development of railways laid stress on the principle of interchangeability and encouraged standardization. The introduction of the superheater assisted in the progress of fuel economy. In 1827 coal consumption was 1·60 lb. per ton per mile; at the present time it may be taken at about 0·12 lb. per ton per mile for a main line express and passenger train, and 0·10 lb. for a main line goods and minerals train.

Steam automobiles were tried out on the road, as, for example, Goldsworth Gurney's steam carriage in 1828, but their commercial failure forms a striking contrast with the rapid development of the railways, and self-propelled road vehicles had to await the development of the petrol engine.

The Revolution in Shipbuilding

Commerce depends on transport, and before the Industrial Revolution limits were set to industry by the difficulties in marketing.

The first iron boats appeared on canals as early as 1710, and about a hundred years later sea-going ships were made of iron, whereby their durability and practical efficiency were increased. The application of the steam engine to the propulsion of vessels was a landmark in human progress. The invention was the work of many individuals in Europe and America, principally Symington, Fulton, and Bell. The Atlantic was crossed by a steam-propelled ship in 1827, and the steamboat became a recognized factor in overseas transport. steam vessels being not

only used for carrying mails but also included in the Official List of the Royal Navy. Ten years later Brunel's "Great Western" inaugurated regular transatlantic passages. The chief credit for the invention of the screw propeller in 1834 goes to F. P. Smith. The Cunard Line was established in 1839, from which date the British merchant marine entered upon a new stage of its history.

The coming of the steamship occurred during a change in shipping policy from the protection of the Navigation Laws to free competitive conditions. The change in technique was progressive, and specialization of ships was a further refinement. Shipbuilding is an industry for which this country has a natural aptitude, and has maintained its supremacy in spite of the growth of foreign shipbuilding often subsidized by the government. The science of refrigeration has caused revolutionary changes in the food supplies of industrial countries, enabling shipment of perishable foods from one side of the world to the other.

Progress in locomotion, whether by ship, train, automobile, or airplane, has been materially hastened by improvements in the science of metallurgy, and the converse is equally true.

The Steel Age

Bessemer read his first paper on the converter process in 1856. The three-quarters of a century which has elapsed has seen its rise and fall in this country. This invention had a great effect on industrial development, the almost universal growth of cheap forms of transport being due to its cheapening effect on the production of steel. It has been, however, largely replaced by the open hearth process, as the manufacture of steel by this method can be more carefully controlled, and the metal is of higher quality. This process is associated with Sir William Siemens, and makes use of his invention in 1867 of the regeneration of heat from waste gases, a principle of great importance in the conservation of fuel. The utilization of phosphoric

iron ores was made possible by the invention of the basic process by Thomas and Gilchrist in 1878, which made valuable large quantities of British ores previously useless, but which was specially advantageous to the owners of huge deposits on the Continent, particularly in the Lorraine area. The Thomas process was responsible for the development of the West European steel industry to a world position second only to that of the U.S.A. A valuable by-product from the process is basic slag, which is used as a fertilizer and for the preparation of road materials.

The invention and production of alloy steels was pioneered by Sir Robert Hadfield in 1882. The improved qualities of steel have rendered considerable economies in engineering constructions possible, due to the less weight of metal required for a given strength. In the present century the electric furnace process for the manufacture of steel has been introduced, but its economic utility has been somewhat limited by the cost of electric power. The revolutions to which we are nearest are the most difficult to appreciate, but there is no doubt that recent years have witnessed tremendous developments. The high frequency electric induction method of melting metals is extending rapidly; many improvements have been made in cast iron for applications hitherto impracticable; a large and important family of light metals have been developed; hard metals based on tungsten and other carbides have greatly increased the rate of machining operations and revolutionized machine-tool construction.

Summing up, it may be said that progress in engineering for the last century and a half has depended on inventions made possible by the provision of suitable metals, of which steel is by far the most important. A steel works itself is an excellent example of modern engineering progress.

Power Generation: (*a*) The Steam Turbine

Over a century elapsed after the invention of the steam engine before another form of prime mover became a

practical and economic success. The fundamental idea of a steam turbine had been known from the time of Hero's reaction vessel in the days of ancient Greece, but it was not until 1884 that the conception of splitting up the fall in pressure into small expansions over a large number of turbine wheels in series enabled commercial development to take place. Sir Charles Parsons produced his first 4-kW turbine in 1887, the steam consumption being 200 lb. per kW-hr., and introduced the condensing type in 1891. Since the former date the steam consumption per horse-power hour has been reduced to approximately one-tenth. Turbines have facilitated the advance of high-speed electrical machinery and, since the perfection of helical gearing, have been widely applied from 1894 to ship propulsion. Compared with reciprocating steam engines, they occupy a smaller space for equal horse-power developed, and large units are cheaper than reciprocating engines of equal rating. Steam turbines are now meeting severe competition from internal combustion engines, but the rotary form of engine will always possess certain advantages of its own.

(*b*) The Gas Engine

Not many years after the successful adaptation of the steam engine, interesting developments in gas engineering commenced. Although the distillation of gas and tar from coal was carried out as early as 1688, William Murdock first achieved the practical application of the illuminating power of coal gas about 1792. In 1804 gas was employed in London for heating ovens and stoves, and in 1809 for street lighting. The Gas Light and Coke Company was founded in 1812, and its growth to its present annual capacity of 50,000,000,000 cubic feet of gas, 2,000,000 tons of coke, 28,000,000 gallons of tar, and 78,000,000 gallons of ammonia liquor is indicative of the development of the gas industry in little more than a century.

The use of gas for power purposes developed much later.

Many factory operations proved too light for the steam engine, which was costly, and the need arose for a cheap form of prime mover where the price of coal was high. Although Huyghens had in 1680 attempted to use gunpowder as a source of power, it was not till 1838 that the compression system in general use to-day was invented by W. Barnett. The commercial stage may be said to have started in 1860. In that year Lenoir patented the first commercially successful internal combustion engine, and in 1861 Otto invented his gas engine embodying the well-known four-stroke cycle. Less expensive fuels than coal gas were introduced, including producer gas, water gas, blast furnace gas, and coke oven gas.

The gas engine has the advantage of ease of installation, high efficiency, and the use of a source of power which frequently would otherwise go to waste.

(c) The Oil Engine

Priestmans first produced a heavy-oil burning engine in 1885, and Akroyd Stuart the first hot-bulb engine. In 1892 Diesel arranged for only air to be drawn into the cylinder, compressed, and oil injected in a fine spray, which burned gradually. The present development is towards high-speed solid injection engines. The advantages of the oil engine include low weight and small bulk of engine and fuel, cleanliness and simplicity, high thermal efficiency, and fewer engine staff. The ease of handling and storing the fuel is of importance in marine applications, and the use of heavy-oil engines for ship propulsion has rapidly expanded.

The first application of the oil engine was to vehicle propulsion by Daimler and Benz about 1884; ten years later, due to the work of Butler, Root, and Levassor, the motor-car was a practical success. It has produced great changes in social life, and mechanically-propelled commercial vehicles have developed successfully for the transport of goods and passengers, and are now serious competitors

of the railways. They avoid a good deal of re-carting and intermediate handling of goods, and are specially valuable in the transport of foodstuffs.

The petrol engine made flight possible by heavier-than-air machines, the pioneers being the Wright brothers about 1903, probably the most notable achievement of the century. War experience added greatly to the reliability of the aeroplane engine. Wonderful progress has been made in the power developed by unit weight, and the achievements as regards reliability are illustrated by transatlantic flight in both directions. Europe and America are now covered with networks of regular passenger services. Where saving in time is essential, as for mails and certain special classes of goods, air transport is already economical, though all countries subsidize their services.

The Age of Electricity

The Industrial Revolution ushered in the age of steam, and we have seen that during the latter part of the nineteenth century other prime movers were developed. It appears highly probable, however, that what steam was to the last century electricity will be to the present one. The roots of the age of electricity, which is affecting the whole of our industrial and social structure, were laid in the wonderful discoveries of Michael Faraday in magnetism and electromagnetism in 1831. Based on his work, a rich harvest of inventions was reaped by Cooke, Wheatstone, Bell, Edison, Lodge, Marconi, and many others, which has not only greatly benefited the industrial and business communities, but added considerably to the amenities of life. To mention only a few of the principal developments—electric power generation, heating and lighting, electric traction on both tramways and railways, the telegraph, the telephone, X-rays, radio communication and television—is sufficient to indicate the extent to which electricity has been applied in the service of man.

The steam age produced crowding of the population on the

coalfields, and was responsible for the rise of the industrial north. Electrical energy, which can be distributed over long distances without appreciable loss, is already causing a perceptible decentralization of population with a tendency for its centre of gravity to shift again southwards and may also cause a revolution in agriculture. The vast network of supply lines from large interconnected central stations with which the country has been covered will strengthen this tendency of rural repopulation by rendering available power without dust and smoke and at more economical prices in localities far removed from coal supplies. Electrical traction is also serving to nullify the factors of centralization characteristic of the nineteenth century.

In view of the enormous drain on our coal resources in power generation reference should be made to the progress achieved in fuel economy. In 1814 the coal consumption per i.h.p. was about 12·5 lb. This had been reduced to 3·25 lb. in 1844 and 1·5 lb. in 1891. In this latter year the heat consumption was over 40,000 B.Th.U.'s per kW-hr. generated by a Parsons steam turbine and alternator. The national average fell from 20,000 B.Th.U.'s in 1921 to less than 10,000 in 1939. At the most efficient station in Newcastle-on-Tyne the coal consumption fell from 17 lb. to 1·3 lb. per kW-hr. over the same period of years. The average consumption in Great Britain of coal per kW-hr. fell from 3·0 lb. in 1920 to 1·25 lb. in 1939, the best practice being below 1 lb.

In developing means of extremely rapid transfer of information, electricity has caused the world to shrink, and to constitute a single market.

When we consider the engineering inventions of the past, it is apparent that the nineteenth century was without parallel. Will it constitute a record, or is the rate of progress continually speeding up, so that the twentieth century will be an even greater monument to the creative powers of man utilized for the economic benefit of the race?

The Commercialization of Inventions

Invention is the heart of industry, but when stressing the importance of invention we must not overlook, from an economic point of view, the difference between the original successful experiment or demonstration in the laboratory and the ultimate commercial form or result which is made available for general use or consumption. The man who transforms the inventor's idea on to a practical scale so that it can be supplied to a large number of users is performing an economic function of perhaps greater utility than the originator. The two types of mind are rarely found in the same individual. Such men as Parsons, Marconi, and Edison are exceptions. The development of the steam engine was as much or even more due to the organizing capacity, business ability, strength of purpose, and control of capital contributed by Boulton as to the inventive genius of Watt. There had to be a Theodore Vail as well as a Graham Bell for the telephone to rise with phenomenal rapidity into general use. Yet while the entrepreneur must be a business man who is usually in a position to make certain of the material benefits of his enterprise, the inventor may not even have considered the question of profit and it is a reproach that his genius should often go unrewarded.

The Second Industrial Revolution

The great depression of the early 1930's witnessed a second industrial revolution under the spur of the necessity for reducing production costs. The table that follows indicates some of the changes in factory productivity that have taken place over the past fifteen years and particularly since 1930. The data are based on the censuses of industrial production compiled by the Board of Trade in the years in question. Changes in the constituents of output make precise comparison difficult, so calculations have been made both on the basis of the output in 1930 and on the different

composite output of 1935. The latter figures are shown in parentheses as percentages of 1930 in the table, but in the text reference will be to a mean of the two figures.

OUTPUT, EMPLOYMENT AND WAGES 1924–35[1]
FACTORY TRADES

	1924	1930	1935
Net Output (value added) £ mn.	1,076	1,065	1,151
Number of Employees ('000s):			
Operative	4,345	4,286	4,363
Administrative	512	590	655
Total	4,857	4,876	5,018
Net Output per Employee £	222	218	229
Average Value of Unit of Net Output (prices)	100	94	79
Physical Production:			
Aggregate	100	105½	135 (123)
Per Employee	100	105	131 (119)
Per Operative	100	107	134½ (123)
Total Earnings per Operative	100	98	102

While the number of factory operatives shows little change over the twelve years, there has been a striking increase in the number of administrative employees, illustrative of the increased appreciation of the importance of management. Between 1924 and 1935 the number of administrative employees in all trades increased from 8·7 per cent of total persons employed to 11·4 per cent, while in factories the increase was from 10·5 per cent to 13 per cent. Factory output has increased out of all proportion to service output, e.g. the distributive trades, hence there has been a relative lack of demand for factory employment and a greater demand for employment outside factories. Of the total increase in insured employment between 1929 and 1938 half was in the following trades: distributive, entertainments, etc., hotels, etc., Government and road transport (from 2·6 millions to 3·2 millions).

[1] Memo. No. 75 Royal Economic Society: G. L. Schwartz and E. C. Rhodes.

From 1924 to 1930 physical production per employee rose by less than 1 per cent per annum, but in the following five years the annual increase was from 4–5 per cent. Per operative the increase in the latter period was still greater, and over the whole twelve years amounted to about one-third. The individual trades have, of course, varying experience, and while in all industries output per operative rose between 1930 and 1935 by 27 per cent, in engineering it rose by 57 per cent.

The fall in prices over the period covered meant that the value of the net output of industry rose to a far less degree than did its volume, but it is also significant that while money earnings per operative were only 2 per cent higher in 1935 than in 1924 yet the value of his real output in terms of 1924 prices was 6 per cent greater.

It is certain that the improvements in output shown between 1930 and 1935 have been continued in the past few years, but unfortunately the authorities have refused, in spite of repeated pressure from economists, to undertake annual surveys of production.

A last point to which attention should be drawn is the enormous potentialities of production. In 1924 over 10 per cent of insured workers were unemployed, in 1935 over 15 per cent, in the boom year 1937 11 per cent. The war may force the utilization of the labour reserves of the country, just as it is further intensifying the rate of output per head. The main feature of the evolution of industry is the acceleration of activity, productivity and invention. The pace is quickening in the acquisition of knowledge, in scientific discovery and its application to transport, industry and communication. We have only touched the fringe of possibilities. It only remains therefore to point out that the full employment and maximization of output that can be organized for war can, technically, be organized for peace. The second industrial revolution has only accentuated the failure of our economic system to expand incomes and demand to keep pace with the potentialities of production.

FURTHER READING

(*a*) *An Outline of Industrial History:* E. Cressy. (Macmillan.)
Britain Without Capitalists. (Lawrence and Wishart.)

(*b*) *Economic History of Modern Britain:* Clapham. (Cambridge University Press.)
Industrial and Commercial Revolutions: Knowles. (Routledge.)
The Rise of Modern Industry: J. L. and B. Hammond. (Methuen.)

CHAPTER V

BUSINESS ORGANIZATION

BUSINESS is organized into one-man businesses, partnerships and companies broadly according to the amount of capital required. Co-operative and public forms of industrial ownership have also developed.

PARTNERSHIP

Partnership is "the relation which subsists between persons carrying on business in common with a view to profit."[1] In a partnership the capital and efforts of the partners are joined, control and profits are shared, and the partners are jointly, and in Scotland severally, responsible for the debts of the partnership. Profits (and losses) are equally shared unless otherwise agreed, so that the agreement must be strictly defined in the Articles of Partnership.

In an ordinary partnership each partner is liable for the whole of the debts due by the firm, but there may be partnerships where the liability of some of the partners for debts of the firm is limited. By the Limited Partnerships Act of 1907 a partner may fix the limit of his responsibility for the firm's debts to the amount of capital which he undertakes to contribute, but takes no active participation in the management of the business, and has no power to bind the firm. There must be one or more general partners, and the partnership must be registered at Somerset House.

JOINT-STOCK COMPANIES

Between a partnership and a company there are a number of distinguishing features. A joint-stock company may be defined as a combination of individuals who subscribe their

[1] Partnership Act, 1890, which governs this form of organizatio

capital by taking shares in an undertaking, the chief aim of which is the earning of profit for the shareholders. The persons associated contribute their money to a common stock, which is used in some trade or business, but the number of associates is usually too great for them to share in the management, which is delegated to paid managers. In a partnership a new partner cannot be introduced without the consent of all the existing partners. In a joint-stock company the shares are transferable, though the right to transfer them may, on occasion, be more or less restricted.

Principle of Limited Liability

In 1855–1862 the principle of limited liability was introduced. The private property of the shareholders is dissociated from the company's debts, and the liability of each is limited to a definite amount, i.e. to the value of the shares for which he has agreed to subscribe. If the shareholder has fully paid for the shares which he promised to take up, he has no further liability. As indicating the effect of the introduction of this principle, it may be noted that in 1862 there were 360 joint-stock companies, between 1862 and 1870, 5,758 companies were registered under the Companies Acts, and between 1922 and 1930, 76,579. The limited liability company is to-day the normal unit of business. Together with the mechanical inventions which constituted the Industrial Revolution, the principle of limited liability was the cause of the building up of modern industry on its present scale. It is an elastic and adaptable procedure which has facilitated the accumulation of capital and enabled the development of large-scale production to take place. Large and continuous work is better done. Some businesses specially benefit from the use of large capital, such as banks and insurance, transport, and public utility companies.

The following table gives the number of firms (factories) in the country at the present time, and indicates their distribution in accordance with the number of employees.

DISTRIBUTION OF FACTORIES ACCORDING TO SIZE

Size Group	No. of Employees (average)	No. of Factories	Percentage of Grand Total	No. of Persons Employed in Size Group	Percentage of Total (Persons)
1–25	12	103,730	77·4	1,242,760	21·6
26–50	36	11,571	8·6	416,556	7·2
51–100	75	8,113	6·1	608,475	10·6
101–250	170	6,830	5·1	1,161,100	20·2
251–500	320	2,421	1·8	774,720	13·5
501–1,000	750	949	0·7	711,750	12·3
1,001 and upwards	2,000	421	0·3	842,000	14·6
	3,363	134,035		5,757,361	

Among the advantages of the limited liability joint-stock organization we may note that it encourages the investment of small savings, and that the publicity of accounts and the creation of large reserve funds tend to give greater security. The principle of limited liability also distributes risks widely and business may be taken up which, from the risk involved, would repel individual enterprise. Other advantages are that the partition of the capital into shares provides a very convenient method of dividing profits, and that the shares are readily transferable.

POSSIBLE DISADVANTAGES

The principle of limited joint-stock enterprise has accentuated, however, the division between ownership, management, and labour. The owners are the shareholders who usually have no special knowledge of the trade or the prospects of the business, and are liable to be swayed by a few well-known names on the prospectus. They place their capital under the control of others whom they employ for the purpose of running the business. Owing to their remoteness from the work and the workers, they take little interest in the management. The shareholders are the ultimate undertakers of risk, but exert no direct control over the conduct of the business; in fact, if dividends are being paid they can be relied on not to interfere in any way.

Joint-stock organization has induced a new distribution

of works management and emphasized its primary importance. There has arisen a class of men specialized in organization and management. They are concerned with translating the policy of the directors into action and with the superintendence of this action, but their earnings resemble the earnings of pure labour.

The elasticity of joint-stock organization has been referred to, and as it lends itself to large-scale operations it frequently leads to monopoly. This is not intended to convey, however, that the policy of overwhelmingly powerful concerns will lack foresight or that their actions will be unfair; in fact, they may tend to produce steady conditions. They do, however, militate against the rise of young firms.

Such disadvantages as may be found in joint-stock organization are not to be solved, however, by going back. The industrial unit for reasons of technical efficiency has grown and the joint-stock principle has been an essential accompaniment of that growth. New difficulties must find their new solutions; new forms must arise which resolve the antagonisms without interfering with the development of the productive efficiency of industry. The line of economic development is always forward.

Trusts and Holding Companies

One of the chief devices which are used to form industrial monopolies is the trust, whereby ownership and control are concentrated by an amalgamation by which the whole or most of the capital of the combining firms is transferred to trustees, who in return issue trust certificates to the several owners.

The *modus operandi* may be illustrated as shown on page 123.

The advantages sought are (1) promotional profits, (2) monopoly profits, and (3) efficiency profits.

In this country the trust movement was stimulated by the growth in size of the industrial unit and the increase in amalgamations. Trusts developed earlier in the U.S.A.

and Germany owing to the ease with which raw materials could be controlled and the existence of protective tariffs.

The *holding company*, as illustrated below, is not an operative company but serves as the mechanism whereby control is maintained over a series of operative concerns. On the other hand, a company, itself an operative concern,

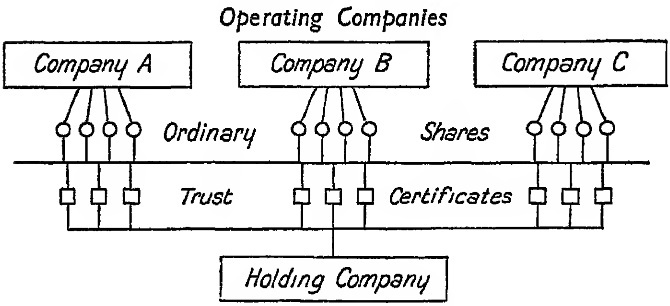

FIG. 4. STRUCTURE OF A TRUST

may control a series of further companies; the controlling company may then be known as the parent company while the other concerns are subsidiaries.

The principle of trustification, together with the nature of share capitals, makes it possible for widespread control often to be exercised by a comparatively moderate capital. Preference shares do not normally carry voting rights and control is therefore vested in the holder of 51 per cent of the ordinary shares, although if there are no other single large share-holdings much less than this proportion will suffice. A company with a small ratio of ordinary to preference and debenture capital is said to be highly geared, i.e. a small share-holding drives a large total capital. If a high-geared company holds 50 per cent of the shares in another high-geared company, which in turn owns 50 per cent of the shares in several other high-geared companies, and so on, then the company at the top of the financial pyramid exercises a vast control though its own stake may be very limited, while in a similar way an individual or group of

individuals may control a mass of industrial capital out of all proportion to their private wealth.

Determination of Policy

The policy of joint-stock companies is decided in its broader aspects by the board of directors (whose remuneration is provided for in the Articles of Association), which avoids rashness, as it must be justified after mutual consideration and discussion by several persons. By the judicious selection of directors it is possible to secure the best information and business judgment available at a moderate cost. In the multiplicity of counsel there is, however, the danger of division, and a difficulty in taking rapid decisions may arise. It is thought that joint-stock companies seldom have the enterprise, unity of purpose, and quickness of action of private concerns.

Nevertheless, joint-stock companies do not always lack personal leadership. In some cases they are merely the form under which persons of great organizing ability obtain control over large amounts of capital. Even outstanding personalities, unless they hold more than half of the voting power attaching to the shares, have, however, to convince the board of directors of the desirability of their purposes and proposals before a decision can be arrived at. It is sometimes argued that control and management become largely a matter of routine in joint-stock companies, and that directors and managers are less keen in their duties than if the business were their own, or not so cautious, or that internal knowledge may be used against the interest of the shareholders. Fortunately, this is not generally correct, but it is sometimes found that small economies and gains tend to be disregarded. The science of management is designed to resolve such difficulties. It may be said that under modern conditions both public and private companies appear to have their respective spheres. The former organization seems to be well suited to industries having highly developed markets.

Incorporation of a Company

At the present time the vast majority of new limited companies are incorporated under the Companies Act, 1929. We have already seen in what respects a company differs fundamentally from a partnership. The earliest form of incorporation was by charter, and to this method must be added incorporation by a special Act of Parliament, but a preponderating number of industrial concerns are registered under the Companies Act. A company is regarded by law as a person. The first step in the formation of a company is to draw up the Memorandum of Association, which may be considered to represent the constitution of the company, as it is the basis on which the company comes into existence. It governs the external relations of the company. The most important clause in the Memorandum is the objects clause, as the company can only exercise powers which fall within this.

The second step is to prepare the Articles of Association. These consist of the regulations governing the internal management of the company. If the company does not provide and register its own Articles, Table A given in the Companies Act will be the Articles of the company so far as applicable. Application to form a public company must be made by at least seven members, or two members in the case of a private company, who send the Memorandum and Articles to the Registrar of Joint-stock Companies. There must also be filed a return of the directors, a form of consent of the directors to act as such, a contract signed by each director to take and pay for his qualification shares where he has not subscribed to the Memorandum for such shares, particulars as to the registered office, a statement of the nominal capital and a declaration of compliance with the Companies Act. These are open to public inspection. On payment of the registration fees the Registrar issues a certificate of incorporation.

To get people to subscribe for shares in a public company, an appeal is usually issued, called a prospectus, describing

the nature and prospects of the business. Stringent rules are laid down in the Companies Act regulating the manner of this appeal. No allotment of share capital must be made unless the amount named as the minimum subscription has been subscribed. All relevant matters must be disclosed in a prospectus, which must contain no untrue statements, or the law of misrepresentation or of fraud applies. With an existing business it must be shown to be reasonable that new capital could be profitably employed.

As a rule, a capital issue is made through a recognized financial house, and is underwritten. Underwriting is a contract guaranteeing to take up the shares if the public does not. The underwriters are remunerated by a commission.

After incorporation a statutory meeting must be held not less than one month nor more than three months after commencing business, and a report made to each shareholder of the number of shares allotted, cash received and paid out, particulars of directors and other officials, and the modification of any contracts. A general meeting must be held once a year, not more than fifteen months from the last. An extraordinary meeting may be called at any time on request by the holders of not less than one-tenth of the issued share capital.

Capital of a Company

The capital of a company is usually divided into three classes of shares according to the risks which the holders take in the business: (*a*) preference shares, which are entitled each year to a fixed dividend which may be cumulative, i.e. if sufficient profit is not earned in any year the deficit is carried forward to the next or succeeding years; (*b*) ordinary shares, which receive the balance of the divisible profits after the preference dividend has been paid; (*c*) deferred or founders' shares, which are usually held by the promoters and receive no dividend until a stated percentage has been paid on the ordinary shares.

In the event of the company being wound up, the preference shareholders usually have a lien on the company's assets prior to that of the ordinary shareholders. Under the Act of 1929, preference shares redeemable out of profits may be issued.

Uncalled capital is the amount of the capital remaining uncalled on the shares actually issued. Watered capital is that part of a company's capital not represented by any tangible profit-bearing assets, e.g. a company may distribute accumulated profits to its shareholders, not in cash but in the form of bonus shares; the share capital of the company is thereby increased but not its profit-earning capacity.

A limited company may raise money by the issue of debentures, which are, however, not a part of a company's capital but a special method of borrowing money, the security given being the company's assets. A debenture is a document issued under the common seal of the company, promising to repay a sum of money with interest at a certain date under stated conditions, or an IOU for money loaned. Trustees on behalf of the debenture stockholders may be appointed. The debenture is associated with a trust deed secured on the property of the company and the stock is repayable by the trustees. In the event of winding up, debenture holders have the first charge on the company's property after payment of preferential debts.

A large debenture capital may cause the ruin of the company if it gets into difficulties, for while dividends on ordinary shares do not have to be paid if there are no profits, interest on debentures must be paid whatever the state of the business, in default of which the debenture holders can liquidate the business in their own interests.

Debenture issues are a means of raising money at a low rate of interest but may mean that a company is in difficulties and have an immediate effect on its credit. A company may mortgage to the debenture holders its land, buildings, and machinery, or may create a floating charge on all its

assets. A floating debenture is a charge on the undertaking which does not attach itself to any part of the company's property unless the company is in default with regard to either interest or the repayment of the principal, and the debenture holders take steps to realize their security.

The Balance Sheet

Every year a public company must by statute submit to the Registrar of Companies a list of members, the address of the registered office, an annual summary of its capital account, any commissions paid or discount allowed in respect of shares and debentures, shares forfeited, share warrants issued and surrendered, particulars as to the directors, a list of mortgages and charges, and an audited balance sheet.

A balance sheet is a statement drawn up at the end of each financial year, setting forth the various assets and liabilities

Liabilities		*Assets*	
Capital	Shares authorized Shares issued Amount paid up	*Fixed Assets*	
		Property	Immovable property Movable property Plant
		Floating Assets	
		Stock in trade	
Debts to Creditors	Loans, mortgages Debts owing by company Bills Payable	Debtors	Debts owing to company Bills Receivable
Reserve Fund	Amount set aside from profits	Cash and Investments	Nature of investment Cash at bank Cash in hand
		Hypothetical Assets	
Profit and Loss A/c	Undistributed profits plus profit for year	Expenditure carried forward	Preliminary expenses Goodwill

of the firm at that date. Properly drawn up it gives information on the nature and amount of the assets and liabilities, whether the firm is solvent (assets greater than liabilities), and whether it is over-trading (debts to creditors greater than liquid assets).

The balance sheet is not an account in the book-keeping sense; its form is prescribed in the Companies Act, 1862.

A copy of the balance sheet must be sent to every member of the company. The auditors must vouch for its accuracy and are liable for damages in the case of a breach of trust. An auditor now has the right to attend general meetings and, if necessary, to speak on the accounts he has audited.

It is sometimes stated that the construction of the balance sheet is out of date. Machinery, unless thoroughly up to date, has no market value. Money spent on machinery means little or no more than money spent on materials; if no profit arises from its operation, it is practically worthless. Moreover, owing to specialization, factory buildings may have little market value.

Instead of ordinary shares being offset in the balance sheet by the capital value of plant, machinery and buildings as they usually are, it has been suggested that they be given no par value, and plant, machinery and buildings written down promptly to scrap and site values.

The par or nominal value of ordinary shares is fictitious, as it depends on the profit-earning capacity of the company and not on the original value of the plant, machinery and buildings.

American companies in fact often do not have a par value for their shares. The holder of one share in a company which had originally raised $1 million capital in one million ordinary shares, is simply regarded as entitled to one-millionth part of the distributable profits of the company, and the value of his share depends on whatever such distribution may amount to.

The Companies Act, 1929, instituted a number of reforms.

Every "offer for sale" of shares or debentures is now deemed to be a prospectus, and house-to-house share-hawking is forbidden. The responsibilities of directors are increased, and directors and officers of a company cannot so readily be exonerated from liability for their own carelessness. Special provision is made for the valuation of shares in or debts due to or from subsidiary companies, which must be stated separately in the balance sheet. The machinery for passing special resolutions has been simplified.

The forgery of share certificates and other securities is by no means impossible, and it is suggested that special audits of share and transfer registers should be made obligatory.

Private Companies

A private company is one which restricts the right to transfer its shares. It is prohibited by law from issuing any invitation to the public to subscribe for its shares or debentures, nor must they be offered for sale to the public. The number of its members is limited to fifty, exclusive of employees. A private company need not publish a statement in lieu of a prospectus, nor is it compelled to file a balance sheet with the Registrar of Companies. Members of the company only are entitled to receive a copy of the balance sheet and auditors' report on payment of a fee not exceeding 6d. for every hundred words. Private companies have met with considerable popularity, which accounts for the fact that business men seldom avail themselves of the Limited Partnerships Act, 1907. When finding the capital for a private limited company, a memorandum embodying the proposal with regard to its formation, sometimes called "confidential particulars of the proposed company," may be sent to prospective subscribers.

The Company in Liquidation

We have now to consider the ways in which a company may be dissolved. It should be noted that a company may

be wound up in three ways: (1) compulsorily, by order of the Court, (2) voluntarily, and (3) voluntarily but under supervision of the Court.

A common feature is the appointment of a liquidator who administers the assets of the company.

Under a winding-up order the procedure is somewhat as follows: The Registrar of the Court forwards copies of the order to the official receiver, who gives notice to the Board of Trade, and the notice is gazetted. The official receiver becomes provisional liquidator until he or another person is appointed liquidator. He must summon separate meetings of the creditors and contributories. The latter are members of the company on whom further calls of capital are outstanding. Two lists are made out, "A" consisting of the present members of the company, and "B" consisting of persons who have ceased to be members within a year, and whose liability is limited to debts contracted before their membership ended. The appointment of a committee of inspection is considered at the meetings referred to, and if agreement is reached, the appointment is made by the Court. The committee meets at least once a month and audits the liquidator's accounts. The liquidator may apply to the Court for the appointment of a special manager. The further duties of the liquidator are numerous. He receives proof of debt, brings and defends actions, receives payments which he pays into the company's liquidation account at the Bank of England, holds meetings, keeps accounts and audits, pays debts and distributes dividends (if any) to the shareholders according to their respective rights. He reports periodically to the Court.

Voluntary winding up takes place for reasons of convenience, tactics, determination of purpose, enlargement of function, reorganization, or inability to continue business because of the liabilities of the company. In voluntary liquidation, the liquidator may exercise all the powers of a liquidator in a compulsory winding up, but he is appointed

by the company in general meeting or by the creditors, according to whether it is a members' or creditors' winding up.

It may be noted that a company may go out of existence without being wound up, namely, by reconstruction or merger. In the latter case it is necessary to transfer the company's business and assets to another concern in consideration wholly or in part of shares in the transferee company. A general authority is conferred on the liquidator to do this, but any member who dissents may request the liquidator to abstain or buy the shareholder's interest at an agreed price.

A company may always increase its capital where it has power to do so in the Articles.

If a company wishes to reduce its capital in order to enable it to pay dividends where assets are lost, or it requires to borrow fresh capital, a special resolution is necessary, and it must be confirmed by the Court.

Co-operative Organizations

These organizations are a type most significant in the field of marketing. They are managed in the interests of those who do business with or through the associations, and thus introduce a form of democratic control.

The retail co-operative movement embraces some 1100 societies with a total capital (including loan) of £189 millions, a membership of over 8 millions, and a retail trade exceeding £250 millions, or some 10 per cent of the country's total retail trade. Latterly the field of production has been entered by these organizations, but producer co-operative organizations on a large scale are still in the embryonic stage. The Co-operative Wholesale Society not only supplies the retail societies with 66 per cent of their stocks, but its capital (including loan capital) and reserves of some £65 millions are invested over a wide range of productive enterprises. The 182 factories and workshops include two biscuit works, five preserve works, three soap works, eight flour mills, one tobacco factory, two lard refineries, one

margarine works, an oil and cake mill, six printing works, a rope mill and a colliery, factories for hosiery, corsets, shirts, underclothing, three woollen factories and three weaving sheds, ten clothing factories, ten boot and shoe works (with two tanneries), an iron works, a cannery, six cabinet factories, two tinplate works, a paint and varnish works, a pottery, a cycle and jewellery establishment, drug-works, brush-works, cutlery, aluminium, glass, bucket and fender works, packing factories, building and engineering departments, several smaller works and several farms, including tea plantations. The value added in co-operative production by the 90,000 workers employed amounts to some £25 millions, but this form of control extends to only about 2 per cent of the national volume of industrial production.

Public Control of Business

A certain number of industries are affected with a public interest, such as railways, gas and electricity, water, insurance. It is in these industries that Government or municipal participation has arisen. There may be control without operation or competitive operation. In a few cases the public authority has a monopoly as in the Post Office and the construction and maintenance of highways.

The State as a Business Unit

Until recently the economic system depended largely on the uncontrolled forces of supply and demand to maintain the balance of industry. Competitive capitalism is, however, being transformed into control by corporations. Trade association policies, market sharing, stabilization of prices, and non-price competition are the order of the day.

The economic structure of industrial countries appears to be becoming centralized on national lines. Apart from a natural growth of combination aimed to eliminate the worst features of competition, rationalization has led to the

reorganization of whole industries with centralized control, e.g. in this country the iron and steel, chemical and cotton industries. Combinations and monopoly conditions are producers' interests, but the interests of consumers are equally important. The State, which has already provided services in the interests of trade, e g. consular services, is taking an increased interest in trade and business. Agencies which illustrate this trend are H.M. Forestry Commission, the various Marketing Boards and the Import Duties Advisory Committee. General economic planning in the British Empire is illustrated by the Imperial Shipping and Economic Committees.

The general trend seems towards increased State regulation and managed industries, to which the war has given enormous impetus.

The State may take an increasing interest in industry for various reasons: (*a*) a war may necessitate centralized control of production in pursuance of a single national aim; (*b*) depression and lack of profitability may oblige industry to impose a general degree of control on itself in order to rescue it from its crisis; (*c*) industry may be taken out of the hands of private enterprise and operated by the State representing the general body of citizens.

When examining the economy of a country it is important to recognize that the State is not a super-national body, something detached from sectional interests, or even a body designed to reconcile such interests. The State may simply be the machinery whereby particular interests may dominate the rest. Thus the Fascist State, which comes under the second heading above, is essentially a monopoly of monopolies, that is, a body set up by dominant industrial interests to impose control on all industrialists with the purpose of restoring the profitability of the dominant industries. The process of trustification and monopoly is intensified, and the small units either disappear or come under the control of the larger units by legal process

Industrialists, through the State, may have to impose

all manner of restrictions on themselves, e g. the dismissal of workmen may be forbidden, and with the abolition of trade unions a minimum of social legislation relating to wages, hours, health, etc , will be necessary to prevent undue discontent. Industry will be planned and imports and exports regulated in accordance with this plan In Germany the whole fabric of control was designed to further rearmament as an instrument of imperialism. Many private capitalists found the central control irksome, the regulations contrary to their particular interests, but it was the only alternative to a collapse of the whole economy.

The setting up of the State-controlled Hermann Goering works is sometimes cited to show that the State was competing with private steel firms. The contrary is the case. The works were set up in 1938 to mine low-grade ore, and as steel from such ore could only be produced at a far higher cost than that from imported ores, the State undertook production in the cause of self-sufficiency and passed the loss on to the taxpayer.

The Russian Socialist State comes under the third heading. Private enterprise, other than self-employment, had been eliminated by 1928 and the control of industry vested in State trusts. Industry and the State are one and there is no private ownership of the means of production. All activities, including education, health and all social services, are planned on a five-year basis under a system of priorities. The first five-year plan aimed at tremendous industrialization and the production of consumers' goods was deliberately held back in order to concentrate productive power on the output of capital goods. Similarly, agricultural produce was exported to facilitate the import of machinery. The second five-year plan increased the relative output of consumers' goods, but this process which should have been intensified in the third plan was slowed down by the worsening of the European political situation which obliged a concentration of productive energy on rearmament. The

following tables illustrate the progress of the planned economy—

INDUSTRIAL OUTPUT U.S.S.R

	1929	1932	1938
Total Output . . .	100	183	477
Capital Goods . . .	100	213	510
Consumers' Goods . .	100	156	311

INDUSTRIAL OUTPUT OF U.S.S R. COMPARED WITH GREAT BRITAIN 1938

	Pig-iron	Crude Steel	Electricity
Actual Output:			
U S S R. . .	15 mn tons	18 mn. tons	39·000 mn.kwh
G.B . .	7 ,,	10½ ,,	29·000 ,,
Output per Head:			
U S S R. . .	87 kg.	107 kg.	233 kwh.
G.B . .	145 ,,	266 ,,	620 ,,

The first table shows the enormous strides made, the second the progress that has yet to be made in view of the large population in spite of impressive current outputs. An interesting comparison can be made with Germany: Russian pig-iron output was one-third of the German in 1929, but had equalled it in 1938.

That Soviet planned production has resulted in phenomenal industrial advance appears from the fact that Russia's share of total world output which was some 3 per cent in 1913 and also in 1928 (when the first five-year plan began) had reached 13·2 per cent in 1936. The table on page 137 shows as a percentage the Russian share in world production of certain commodities.

The profit motive has been replaced by numerous incentives and methods of "socialist competition." The absence of private investment and centralized control of production, on the basis of real need in relation to productive capacity

	1928	1936
Coal	2·9	11·2
Oil	5·7	12 0
Electricity	1·9	8·6
Steel	4·0	15·4
Copper	1·8	7·6
Aluminium	—	9 9
Superphosphates	1·0	9·7

in place of the criterion of profit, renders the U.S.S.R. immune from cyclical fluctuations and leaves technical limitations as the only obstacle to industrial progress.

FURTHER READING

(*a*) *Business Organization:* L. R. Dicksee. (Longmans.)
Practical Economics: G. D H. Cole. (Pelican)
The Pleasures of Planning: Horrabin. (Macmillan.)

(*b*) *How to Form a Company* · H. W. Jordan (Jordan & Co.)
British Industries and their Organization · G. C. Allen. (Longmans.)
The Principles of Economic Planning G. D. H. and M. I. Cole. (Macmillan.)
Soviet Communism: A New Civilization: S. and B. Webb. (Longmans.)
The Spirit and Structure of German Fascism: R. A Brady. (Gollancz.)

CHAPTER VI

THE TRADE CYCLE

ALTHOUGH the term trade cycle is often used with an air of mystery there is nothing mysterious about the actual phenomena that accompany cyclical fluctuations in trade. However puzzling the incidence of a *slump* may be, the facts of it are painfully obvious to all—orders drop off, prices and profits fall, unemployment leaps up, wages are cut and production instead of increasing as it should in a progressive civilized country is heavily reduced and a lower standard of living is therefore forced on the greater part of the population. In a *boom* the reverse phenomena appear—orders increase (tempting firms to overtrade), prices recover and profits soar, employment increases and wage-earners gradually recover their cuts while production forges ahead once more.

The following table shows how the various indices of business activity moved in the United Kingdom between 1929 and 1939—

INDICES OF BUSINESS ACTIVITY IN U.K. 1929–39
Expressed as percentages of 1935

	(1)	(2)	(3)	(4)	(5)
1929 . . .	98·5	98·5	94·5	107·6	—
1930 . . .	93	94·5	88	86·1	—
1931 . . .	87·5	91	79	65	—
1932 . . .	84	90	78·5	65·2	92·5
1933 . .	89	93·5	83·5	75·8	92
1934 . . .	96	97·5	93·5	88·6	94
1935 . .	100	100	100	100	100
1936 . . .	106	105	109·5	116	107
1937 . .	112	111	117	127·2	115
1938 . . .	104·5	110	109·5	—	117
1939 (first half) .	108	112·5	116·5	117·5	116

(1) *Economist* Index of Business Activity
(2) „ „ Employment
(3) Board of Trade Index of Production.
(4) Index of Profits (*Economist*)
(5) „ Retail Sales (Bank of England)

The period 1929–37 witnessed a complete cycle of activity from peak to peak, not only in this country but in all countries excluding the U S.S R. A broad correlation of activity is indeed to be expected on account of the part that overseas trade plays in a modern economy. If an industrial country such as the U.K. suffers a slump, then its demand for raw materials and indeed all imports falls and the primary producing countries suffer a slump too. This means that the latter cannot afford to maintain their industrial imports, and the export trade and the general level of activity of the industrial suppliers are further affected. It is therefore easy to understand how the state of business activity in a major industrial country can influence that of the whole world economy. The special reasons which isolated the U.S.S.R. from the world slump are dealt with elsewhere (Chapter V, page 136), but it must be pointed out now that while it is to be expected that the business activity of nations forming part of the world economy should move broadly in phase, yet the economic structure of a country and its degree of dependence on external trade is more important in determining whether it is likely to be subject to a slump or not. The following table shows the fluctuations in industrial production of the major industrial nations—

TABLE SHOWING FLUCTUATIONS IN INDUSTRIAL PRODUCTION OF MAJOR COUNTRIES

INDICES OF INDUSTRIAL PRODUCTION
1929 = 100

	1932	1937	1938
U.K. . . .	83·4	122·3	114·7
U.S.A. . . .	53·8	92·2	72·3
France . . .	69	81·2	75·7
Germany . .	53·3	117·2	126·2
Japan . . .	97·8	170·8	173
U.S S.R. . .	183·4	424	477
World (excl. U S.S.R)	64	104	93

Past Cycles

The trade cycle has been an established feature of British economic life since the beginning of industrialization, and as far back as 1848 we find the "periodical return" of commercial crises described as follows: "In these crises a great part not only of the existing products, but also of the previously created productive forces, are periodically destroyed. In these crises there breaks out an epidemic that in all earlier epochs would have seemed an absurdity—the epidemic of overproduction. Society suddenly finds itself put back into a state of momentary barbarism: it appears as if a famine, a universal war of devastation, had cut off the supply of every means of subsistence; industry and commerce seem to be destroyed. And why? Because there is too much civilization, too much means of subsistence, too much industry, too much commerce."[1] A reader of the paragraph in 1932 could have been excused for believing he was reading a contemporary account.

The entry into a slump is normally preceded by a financial crisis, and such crises have occurred in the years 1810, 1816, 1825, 1837, 1847, 1857, 1866, 1878, 1890, 1900, 1907, 1921 and 1929. In addition the end of 1937 witnessed the commencement of another decline which only rearmament arrested. It is clear that there is a certain periodicity in the recurrence of cycles, the period between each averaging some ten years, but although there are good reasons why crises should occur periodically there is no reason for trying to regard them in the same way as phases of the moon, or comets, inevitably bound to recur at *regular* intervals.

The Course of Cycles

Economic life is never static: business is always pursuing a definite trend, always in motion, either improving or worsening. Trade cycles have followed a traditional course and at the lowest point of depression there is a low level of prices consequent on low demand, unemployment is high

[1] K Marx and F. Engels

and the volume of production low, business costs have been reduced to a minimum by staff reductions, wage and salary cuts, rationalization and other means, a narrow margin of profit has been restored, bank reserves are plentiful and banks are consequently willing though cautious lenders at low interest rates, business capital is conservatively valued, stocks are moderate and buying is cautious. The fact that business is on a "sound basis" with bad debts written off and great care being taken before incurring fresh debts, and with profits restored, coupled with the fact that capital equipment is in need of renewal, encourages an increase of output. As soon as activity begins to increase the rise becomes cumulative, for an increase in orders placed by one firm causes an increase in the output of other firms, which may in turn involve orders not only for raw materials but also for new machinery, as well as the taking on of additional workers. Activity spreads quickly through the capital goods industries and any tendency for prices to rise speeds up the placing of new orders. The additional wages of the new workers increase the demand for consumers' goods. In short as soon as demand has begun to revive, the whole economic process comes to life—the output of capital goods and of consumers' goods creeps up (giving rise to a still greater demand for capital goods and raw materials), employment increases, higher incomes intensify demand. The demand for raw materials increases the purchasing power of the primary producing countries, leading to an increase in exports to those countries. Wages and other costs rise far more slowly than profits and, while the rate of profit is increasing, a further stimulus is given to production and to investment.

Frequently a special factor gives rise to the initial increase in demand: in 1933 it was the beginning of the housing boom and in 1938 rearmament. The increased incomes resulting from these special activities spread through the whole productive system as a stone thrown into water starts a series of ever-widening ripples. If 1932 is taken as

the base year, by 1933 building activity had increased 29 per cent, by 1934 54 per cent, by 1935 75 per cent, and by 1936 88 per cent. These figures should be compared with the table showing the increase in all business activity over the whole period. The following figures show the total expenditure on defence over 1937–9—

1937	1st half	£106 mn.	1938	1st half	£156 mn.
	2nd ,,	£127 mn.		2nd ,,	£189 mn.
1939	1st half	£269 mn.			

Between the second quarters of 1938 and 1939 the general level of business activity rose nearly 8 per cent.

The period of relatively high activity is known as the "boom" phase of the trade cycle. The term is, however, often a misnomer since there may be nothing hectic about the state of business, and the volume of unemployment may remain high in an absolute sense. This was particularly the case at the 1937 peak (the monthly average of unemployed persons in Great Britain being not far short of 1½ millions) when the term "sloom" was coined.

Several features may mark the passing of the boom phase. In past cycles there was a tendency for credit to be over-extended, both by banks and by traders, for bad debts to be incurred, for highly speculative companies to be floated (this was particularly marked in 1929), and for demand in general to be over-estimated. The main industrial crisis would usually be preceded by a financial crisis, the result of an unsound credit structure. Business profits having ceased to rise at the anticipated rate, shares bought at inflated prices on the Stock Exchange began to be unloaded, and at a period when prices appear to have reached a ceiling, even moderate selling may start a wave of distrust leading to wholesale liquidation of shares and a collapse in paper values. Investors feel themselves poorer and new investment dries up. Luxury purchases are reduced, and demand, both in the capital and consumers' goods industries, starts on its downward path spreading a slow paralysis of trade. The banks restrict loans and raise their interest rates. If

the boom had been marked by intensive Stock Exchange speculation, as was often the case, interest rates had already been raised both on account of a shortage of lending power and a desire to curb undue speculation, so that legitimate traders were starved of loans. Wholesalers, working on borrowed funds, find the cost of carrying large stocks unduly heavy and in order to work on smaller loans reduce their stocks and thus postpone orders to manufacturers. This process of stock reduction also serves to restrict demand and to lower industrial output and industrial payrolls. Once the process of dismissing workpeople begins and total wages fall, the demand for consumers' goods drops and depression begins to intensify. Even before this stage profits have begun to fall as costs have overtaken selling prices, partly on account of the limitation of demand, which both stops the reduction in unit costs and prevents prices from being raised. The restriction of demand spreads as rapidly through the industrial system to paralyse it as expanding demand caused activity to grow.

Although the onset of depression shows itself in various phenomena, there is one particularly striking feature. When production begins to fall it does not fall evenly through all branches of industry, but the capital goods industries—the industries making the means of production —suffer out of all proportion to the consumers' goods industries. The following table shows the percentage output of both branches of industry in 1932 as compared with 1929, in the three major industrial countries—

1932 as Percentage of 1929	U.K.	U.S.A.	Germany
Capital Goods Industries.	70	26	48
Consumers' Goods Industries	90	79	82

There are various readily understandable reasons for the disparity between the two groups: the reduced demand

for consumption goods reduces demand for new capital goods; the fall in profits puts a stop to investment and causes a reluctance to embark on new capital expenditure (e.g. a private person whose income is reduced will continue to spend on food and immediate necessities as before, but he will make his clothes last longer, and his furniture, his car or his house longer still); the drop in taxation yield causes public economy.

As the depression or "slump" deepens, unemployment rises rapidly, wages are cut, profits fall, wholesale prices fall far in excess of retail prices as stocks are liquidated, growing bankruptcies tighten the credit contraction till interest rates fall as sound businesses refrain from borrowing since they see no profitable use for funds. Rationalization, which begins in a crude way by the cutting of staffs and the elimination of the high cost producers, leads on to the stopping of all sources of waste and to the introduction of labour saving and more efficient machinery, till finally costs have been pushed below prices, and when profits begin to emerge the economic stage is set for a revival.

Effect on Distribution of Incomes

The problem of the trade cycle is one of the most vital of the day since no one escapes from it. In the period of depression wages and profits are low and unemployment is high, but prices too are lower so that the real incomes of people remaining in work whose money incomes have suffered only moderate cuts may actually be higher. Income earners as a whole, however, suffer on account of the enormous volume of unemployment. The relation between the national income and unemployment is shown below—

	U.K. Percentage of Unemployment	Net National Income
1929 . . .	10·3	£4,384 mn
1932 . . .	21·9	£3,844 mn.

By 1937 the percentage of unemployment had fallen to 10·6 while the national income was approaching the £5000 millions mark. The rentier holding fixed income bearing "gilt-edged" securities is the only real beneficiary of low prices and slump. In the boom period wages are merely restored while profits are multiplied. Real wages may indeed fall through a rise in the cost of living exceeding the rise in wages, but the working class as a whole benefits from increased employment.

The unemployment and appalling misery of the depression for a large proportion of the population of any industrial country (at the worst point of the 1932–3 depression there were 3 millions unemployed in the U.K., over 6 millions in Germany, and over 13 millions in the U.S.A.; allowing for dependants roughly one-quarter of the populations of the industrial countries was affected) and the setback to the increase in economic well-being make of slumps an unendurable evil for communities which pride themselves on being civilized. Moreover, the slumps are not tending to lessen in intensity; on the contrary, in the twenty years prior to 1914 unemployment averaged 4¼ per cent, while in the twenty years since 1919 it has never been less than 10 per cent. In 1879 and in 1886 the percentages unemployed were 11 and 10, but in 1932 it was 22.

The 1937–8 "recession," though it involved a rise in unemployment of over half a million in nine months and a fall in production of 10 per cent, was arrested too soon by rearmament and war to be representative of normal development.

The Causes of Depression

What is the outstanding characteristic of a slump? It is the fall in demand. This fall is in turn due to the reduction of commitments by business men and to a slackening of investment and the production of capital goods, resulting from a fall in the rate of increase of profits. So long as profits increase at a steady rate expanding enterprise is encouraged and new investment will take place. But the investor is

not interested in current profits, only in *anticipated* profits, and it is the decline in the expected return on invested capital which leads to reduced investment. The following table shows the total of capital issues over two recent periods—

CAPITAL ISSUES IN THE U.K (EXCL BRIT. GOVT.)
(*Economist*)
MONTHLY AVERAGE

	£ mn.
1929	18 3
1932	7·2
1936	16·3
1937	12·8
1938	8·7

How does this reduced return come about? It is necessary to recall how the national income is distributed—partly in wages, expended on consumers' goods or on such types of investment as insurances and house property (the initiative for the investment of insurance moneys lying with the insurance companies), and partly in profits, to which category belong the bigger incomes responsible for the bulk of industrial investment. In a revival wages lag behind profits and after the restoration of cuts new rises are gained with difficulty. There thus tends to be a relatively rapid growth of investable funds, which funds go into the capital goods industries to make up the leeway of the depression years when replacement of capital goods was almost at a standstill. New plant and machinery is bought, railways renew stock, new factories are built, public enterprises such as power stations re-equip themselves, municipalities may, for example, purchase trolley-bus fleets to replace trams, houses are built, and in short a wealth of activity and investment takes place.

In time essential equipment will have been renewed, and the outlets for investment narrow, yet savings are accumulating at an even faster rate. The new investment goods yield more and more consumption goods, but the equivalent income to buy these goods is not available in the form of wages and salaries, only in the form of "profits" which will

not be used to buy such commodities since the owners of these incomes have satisfied their commodity demands and are interested only in fresh investment outlets. A disequilibrium occurs in the economic system, on the one hand the potential productive capacity of industry is growing, on the other hand consuming capacity is rising far more slowly and potential consuming power is hoarded in the hands of would-be investors. "Hoarding" does in fact take place since the absence of increased demand coupled with a growth in productive power, i e. a surplus of capital goods in relation to consuming power, leads to a fall in the hitherto rising rate of profit, constituting a danger signal to investors. "Saving," the setting aside of funds, continues, but "investment," the purchase of capital goods with savings, comes to an end. There is a break in the income-receiving—income-spending cycle; more incomes are being received than spent, which means that there is a relative decline in demand, becoming more and more severe with disastrous consequences.

Revival occurs when the restoration of profits once more leads to an encouragement to invest, while a real deficit in capital equipment provides the necessary outlets. It is clear then that policies designed to cure slumps must aim at restoring the profitability of industry and it is interesting to observe how the governments of various countries approached the problem in the last major depression. In Great Britain the time-honoured remedies were used: retrenchment was the order of the day; Government departments and private firms made drastic salary cuts; costs were reduced in every possible direction, while the Bank of England forced down the level of interest rates to an unparalleled extent. The National Government elected on a programme of restoring business confidence did in fact give a lead in restoring profits through the cutting of costs although this method involved prolonged hardship for the persons whose incomes were the "costs" that were being cut.

In America the New Deal was the name given to a programme that involved the restriction of production in order to raise prices to restore profits, together with social measures that, beneficial as they were to the working population, raised costs and antagonized "big business," and a vast State-spending programme through the running of budget deficits on an unparalleled scale in order to pump enough purchasing power into circulation to keep up the level of demand The efficacy of the programme was partly countered by a "capital strike"—a refusal to invest in new capital goods, particularly by the public utilities and railways—by which "big business" showed its disapproval of the cost-raising social programme, and which incidentally called down some very hard words on business leaders from the heads of the American administration. Heavily as the State spent it was not easy to counteract hoarding by private interests, and when in 1938 the President tried to reduce the Budget deficit, the flow of incomes was cut off at source and the State had finally to start re-spending: State spending had not built up a self-supporting business revival. It is important to note that lavish State expenditure, chiefly the result of borrowing from the banks, did not cause inflation since on the one hand it was countered by hoarding and on the other it never sent demand up beyond the current productive capacity of industry. The administration's aim in increasing demand had been to restore the profitability of private enterprise so that production would be able to proceed under its own momentum, yet in many respects the policy was contradictory since the social programme raised business costs.

In France the Front Populaire Government adopted a social policy even more impressive than that of President Roosevelt, including such measures as the 40-hour week and holidays with pay. Like the American, the French policy, which, of course, raised business costs, was heavily opposed, but the French Government failed to spend on

the Roosevelt scale and the reduction in private business was in no way compensated by direct State expenditure. The Front Populaire Government did not have the courage of its convictions and its experiment failed; it was succeeded by a Government which followed the British method of retrenchment and which had the confidence of business men. The moral of the Front Populaire experiment is that capitalist enterprise must run under capitalist rules; if these rules are broken then the State must accept responsibility for maintaining the level of demand and of production.

In Germany a fascist technique, which is discussed in Chapter V, imposed a rigid system of control over the national economy by which business costs were reduced, while a vast State-spending programme absorbed unemployment and raised demand. Whether well-being was increased is another matter for State expenditure essentially took the form of rearmament.

The only country where production increased rapidly and steadily while the rest of the world was sunk in depression was the U.S.S.R., and the special reasons responsible for this phenomenon are also discussed in Chapter V. In any case the special features of the Russian economy render that country immune from cyclical fluctuations.

Many specious remedies were put forward in the past depression which ignored the true nature of crisis. For instance in the U.S.A. the "technocrats" claimed that as productive possibilities were boundless it was ridiculous for the country to be plunged into depression while men and machinery were idle and raw materials were being destroyed. This was perfectly true, but the declared remedy, that engineers should take over the administration of the productive system, was based on the false assumption that the trade cycle is a technical problem, whilst in fact it is a problem of distributive policy, a problem of maldistribution of purchasing power and of the unprofitability of new investment.

The "social credit" movement also sprang from the sense of incongruity at "poverty in the midst of plenty," and at least escaped from the errors of some aspects of the New Deal which aimed at abolishing the plenty. But the remedy, which was based on a misunderstanding of the flow of incomes through the productive processes, was to distribute purchasing power to make up for purchasing power which was believed lost inevitably and naturally in the productive process. The theorists had proved too much, for had the analysis of the cause of depression been correct the world would permanently have been set on a rapidly steepening down-grade of depression. They did not recognize that purchasing power is never lost, but may be misapplied or hoarded.

Is there any way out of depression other than that actually chosen? The policy of public works has often been advocated (Sweden partly adopted such a policy with success) on the grounds that in time of prosperity private enterprise does all the investment necessary, while in times of depression the State should step in to borrow hoarded funds, or to create sums equal to the amounts hoarded, and invest them in public enterprises to keep the wheels of production turning. The reasons why the policy has not been adopted are several: in the United States the federal government's power to undertake useful enterprise was severely limited by the constitution; in Great Britain private business has been able to insist that if there is work to be done the State should subsidize private industry and not take the initiative itself. The efficacy of a public works programme is shown by the rapidity with which the 1938–9 rearmament brought down the unemployment figures. A serious war has the same effect. Rearmament and war operate, in fact, as "public works" and the energy that is applied to the making of the instruments of destruction could be applied to the social betterment of the nation. Yet what the rulers of a country will do for war they shrink from doing for peace, although there is every economic

reason why the State should step in in time of peace when private enterprise hangs back.

Within twenty-five years two European wars have begun. Wars, still more than slumps, are the negation of economic effort. Slumps mean widespread unemployment with its accompanying frustration of human aspirations, a fall in the standard of living, a general setback to that material progress which should be the aim of economic endeavour and which is the basis of all progress. But war involves far more misery and suffering than the worst of slumps, a far greater fall in the standard of living of most people, a reversion to a barbarism in which destruction and not construction becomes the aim of effort and the standard of achievement. A brief study of the economic causes of war is therefore important and we shall find that the fundamental causes of both slumps and wars are the same, though it is perhaps desirable to point out that these explanations are not universally accepted without question.

Investment is made out of the larger incomes derived in the main from profits. Historically this investment takes place originally at home, first locally, then nationally. After the phase of the mechanization of the bulk of industry the rate of home investment necessarily slows down, but because the rate of saving is being maintained, and even increased with the growth of profits, the pressure to invest continues and is not replaced by a demand for more consumers' goods. Hence comes the era of overseas investment: the equipping of the undeveloped territories with capital goods, railways, power plants, factories, etc. It is obvious that the political control of territory facilitates its industrialization by the controlling country, hence the rush to build up empires and economic spheres of influence which the latter part of the nineteenth century witnessed. Empires have, however, other advantages: they may serve largely as monopoly markets for the mother country which is therefore enabled to buy her raw materials without difficulty. It is true that the raw materials of all

territories are available to any buyer, but a would-be buyer must export before he can pay for his purchases.

The great industrial countries are therefore constantly seeking outlets for new investment and seeking to guarantee and to expand their export markets, so that commercial conflict between the major countries becomes inevitable, e.g. the triangular struggle in the Far East between Great Britain, America and Japan. The belated industrialization of a major European power, Germany, put that power in a position of inferiority in an imperialist sense, and although small nations must develop their trade and investments wherever they can without attempting a political or monopoly control which is impossible for them, a major nation will turn to force to further its economic aims. It is not an accident that militant fascism came to power in Germany at the bottom of a terrible depression, or that in the same period Japan began the first of the aggressions that heralded the collapse of the League system of security. The competition for markets and for outlets for investment, and not personal megalomanias, is the root cause of modern war.

A further point to note is that once a war has begun an enormous vested interest in it is built up. The war industries in all countries are busily and profitably engaged in spite of heavy taxation; unemployment virtually disappears and labour disputes are solvable by martial law. Depression "for the duration" is out of the question since the problem of outlets for investment has been solved: the needs of war absorb all available productive, purchasing and lending power, while a limitless field for "exports" (paid for by the public) is found across the frontiers of the opposing nations. On the other hand the cessation of a war, involving the cessation of a stream of Government spending, the demobilization of armies and the conversion to peace uses of war industries, is accompanied by severe economic dislocation and a slump (as in 1920–21), the political consequences of which may be serious.

There is, of course, a way out from the dangers of "surplus savings" seeking investment. That way can only be by diverting such savings into consumption channels, i.e by raising the purchasing power of those classes of the community that would need to use that power for increasing their own consumption, and by planning production in accordance with the real needs of the people.

FURTHER READING

(*a*) *Introduction to the Theory of Unemployment* J. Robinson. (Macmillan)
The Theory of Capitalist Crisis: J. Strachey. (Gollancz.)

(*b*) *The Great Depression*: L Robbins. (Macmillan.)
The Economic Causes of War. L. Robbins. (Jonathan Cape.)
Britain in Depression Research Committee of British Association. (Pitman)
Britain in Recovery: Research Committee of British Association (Pitman.)

CHAPTER VII

CONTROL: STATISTICS AND CHARTS

Business Statistics

We are principally concerned here with the use of statistics in management. A manager cannot personally investigate all matters under his control, but a series of tables will give him a good idea of the position For example, he may deduce from time-study data whether the time spent by operatives in different parts of their duties is efficiently distributed, or whether the time lost in a shop from stoppage for repairs merits the purchase of new machinery. Obviously, the data must be reliable or the science of management becomes impossible, and they must be prepared and presented in a suitable form. The collection of data is one thing, their presentation another. They must present a picture of things as they exist as simply as possible, or they will not be capable of being used as an efficient mechanism of business administration indicating the functioning of each section. Some of the appropriate and reliable statistics with which an executive must be provided include—

The trend of the business.
The results of different parts.
Comparisons with previous periods, including sales, direct and indirect costs, and profit turnover.
The detailed expenses of the business.
Proof that value is being obtained for what is spent.
Survey of the factory order sheet.
The effect on profit and loss of increase or diminution of production, including ascertainment of the no-profit point.

Obviously there is no section of commercial and industrial activity—market research, planning, budgeting, production control—in which statistics will not prove a pointer

to the executive as to whether the business is being conducted efficiently. Statistics give a bird's-eye view of a very wide field, without which control of a large undertaking would be impossible.

It is not proposed to deal here with the elements of statistics and statistical methods. The student who is not conversant with them should study one of the books recommended at the end of the chapter.

Index Numbers

In statistics we frequently require to determine the relative movements of a phenomenon exhibiting numerical changes over a period of time where measurements of actual movement are inconvenient or impossible, such, for example, as changes in price level or cost of living.

A very simple device involving an application of averages is available which is called an index number. As an illustration of the general principles involved, we will suppose it is desired to record changes in price level. High and low are merely relative terms, and for any kind of measurement a standard is, of course, required. For this purpose a "base" year or month, as the case may be, is chosen, with the price level of which it is desired to compare the price level at other periods.

A large group of commodities, not interrelated, are chosen, and the average prices in the period used as a basis of comparison are ascertained and expressed as 100. At other dates the prices of the same commodities then ruling are taken and expressed in terms of 100. Then the average of these percentages will show how the level of prices as indicated by the selected commodities has varied in comparison with the base period. Let us suppose for the purposes of illustration that five commodities would be sufficient to indicate the variation in general price level. The procedure would then be as shown on p. 156.

At first it is assumed that all commodities are of equal importance, but in actual fact some commodities will

Commodity No	Price in Base Year, 1913	Price in 1937	Relative Numbers in 1913	Relative Numbers in 1937	Weight	Weighted Relative Number in 1913	Weighted Relative Number in 1937
	s d	s. d					
1	10 -	8 -	100	80	2	200	160
2	16 -	12 -	100	75	1	100	75
3	10 -	7 6	100	75	3	300	225
4	4 -	4 -	100	100	4	400	400
5	5 -	6 -	100	120	1	100	120
All commodities . . .			500	450	11	1,100	980
Index Number . . .			100	90	—	—	—
Weighted Index Number .			—	—	—	100	89

account for a higher proportion of general expenditure than others, as, for example, food in working-class expenditure. Hence it may be necessary to "weight" the commodities to allow for this. The table explains how this is done, viz. by multiplying the relative numbers by the weight for each commodity.

The difference between the weighted index and the unweighted index is in this case not appreciable, but in actual practice a much greater number of commodities is selected. For example, in the wholesale price index published by *The Statist*, the number of commodities included is forty-five. The indices published by *The Economist* and the Board of Trade also refer to a large number of articles.

In constructing an index careful attention must be given to what it is desired to measure. Not only must the commodities be carefully selected, but the assumptions on which the weighting is based must be closely scrutinized. The weighting principles adopted would obviously be different for the Index Number of Industrial Production and the Cost of Living Index. In the former the relative importance is measured by the net output, and in the latter by the estimated average relative expenditure falling under the five headings—food, rent and rates, clothing, fuel and light, miscellaneous.

Many criticisms have been levelled against the Cost of Living Index published by the Ministry of Labour, despite revisions in its basic data, but it provides a guide

to retail price changes as compared with wholesale price movements.

CHARTING: ITS AID TO MANAGEMENT

We have insisted on the importance of adequate records, but even when entered on standard forms it is sometimes difficult to grasp their exact significance. The comparison and interpretation of columns of statistics are matters of considerable difficulty. Charts, however, present a pictorial summary of facts which enables a grasp of the entire situation to be obtained at a glance. It is interesting to note that the first instance of the use of graphic records was by J. Jameson in connection with cost control. Charts make facts clear; in this way they considerably assist and facilitate control. The management not only wishes to compare present results with the past but a trend curve gives a guide as to what is likely to happen in the future. Charts enable the executive to visualize the whole course of the business and so make the control of the directing mind simpler and more secure. Organization charts, either concentric or genealogical, show the lines of authority and contact between the various departments and specialists, from which the employees can see their relation to others in the organization. It is easy to visualize the complete organization by means of the picture it presents, indicating the relation of the functions of officers or departments in the company. Charts are of value to the planning or production department where work is scheduled for machines. Route charts or flow diagrams can be made out to indicate what happens from the receipt of an order to the dispatch of the goods. In the shops they picture the movement of the raw material through the manufacture of single parts to the final assembly. As the charts are intended to convey information rapidly, they must be simple and clear in form and construction. In addition to the aid they render to the management in visualizing the situation in the plant, route charts

instruct the employees as to the path of goods on which they perform some operation, and thus render their work more intelligible.

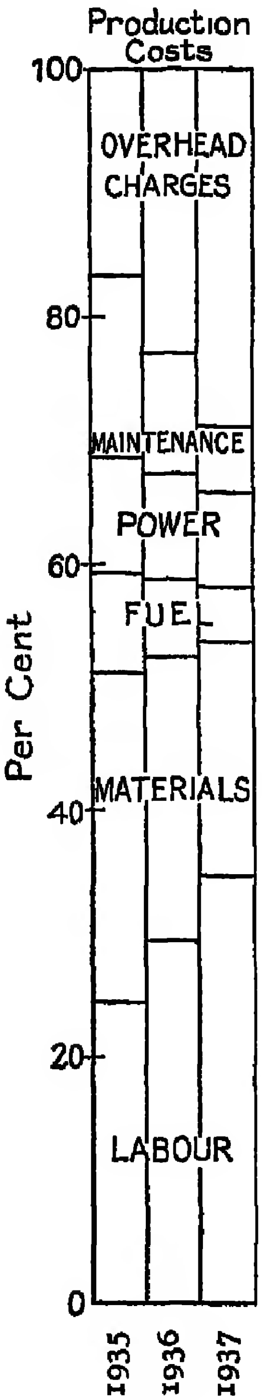

Fig. 5
Bar Chart

We may now briefly refer to other types of graphical records commonly in use. A circle or pie chart is of service to show the make-up of a total, its segments representing the ratios of the component parts to the whole. Bar charts are used to represent the magnitude of quantities, in a manner easy to read. For comparative purposes the distribution of items in relation to the total is best expressed in percentages, and in a series of bars it is easy to follow how each section is behaving. For example, it may be desired to compare for different years the production as a percentage of the rated capacity of a single machine or the whole plant, or the shipments of an order with different sizes or styles.

Another application of bar charts is to represent the distribution of cost, as shown in Fig. 5. The expenditure on the various items, such as raw materials, labour, fuel, repairs, depreciation, overhead, insurance, taxes, and so on, is shown as a percentage of the total cost, and when bars representing consecutive periods are placed in juxtaposition, a clear mental picture is gained of their relative importance and the degree of change which each has experienced. Gummed black paper is useful for making bar charts, which are sometimes preferred to line charts when the time intervals are not regular.

Trend Curves

The following points may be noted with regard to the important class known as line charts. The heading should indicate immediately what the chart is intended to show. For some purposes it is advisable to allow space on the chart to write the actual figures concerned. Too many curves on a chart render it confusing, and it is also desirable not to have more vertical lines than necessary. The choice of a scale requires special attention and false zeros should be avoided.

The type of graphical record most employed is the so-called historical chart, in which time is the independent variable, and the units, days, weeks or months as required, an example being given in Fig. 6. The dependent variable may be any factor of which the management requires a survey, such as production, stock, sales, costs, wages, unfilled orders, work in progress, and many others. When a period is represented by a horizontal space the result relating to that period should be placed in the middle of that space. Not only are the variations in the factors clearly brought out, but the general trend of events is grasped infinitely quicker than from the study of a mass of figures. Sometimes the general trend of the variable is shown by a thick line smoothing out the curve and sometimes by a moving average curve. To get a true picture of the general trend, not only must the seasonable changes but also the business cycles be eliminated. As a rule, however, the true trend is sufficiently indicated by a three-year moving average, which is made by plotting against each year, not the actual figure for that year, but the average of the three years of which it is the centre. For ordinary works management problems such moving averages are not often required, but the importance of trend curves in estimating future movements should not be overlooked Forecasting is becoming more scientific, and no management is getting the utmost value out of its charts and curves unless they are of some assistance in this direction.

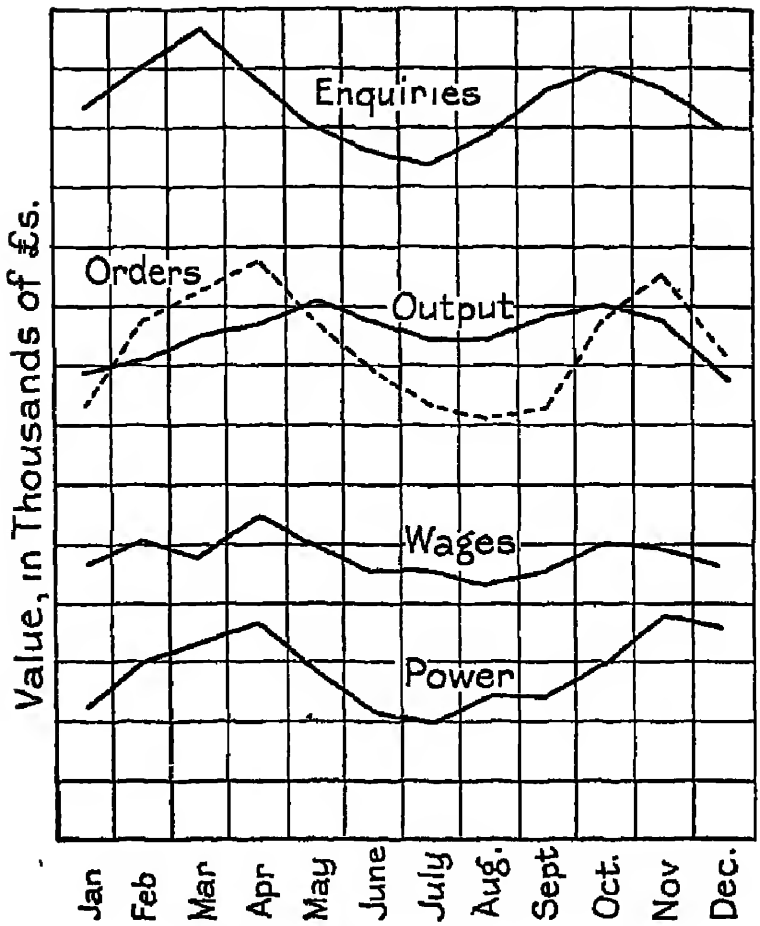

FIG. 6. HISTORICAL CHART

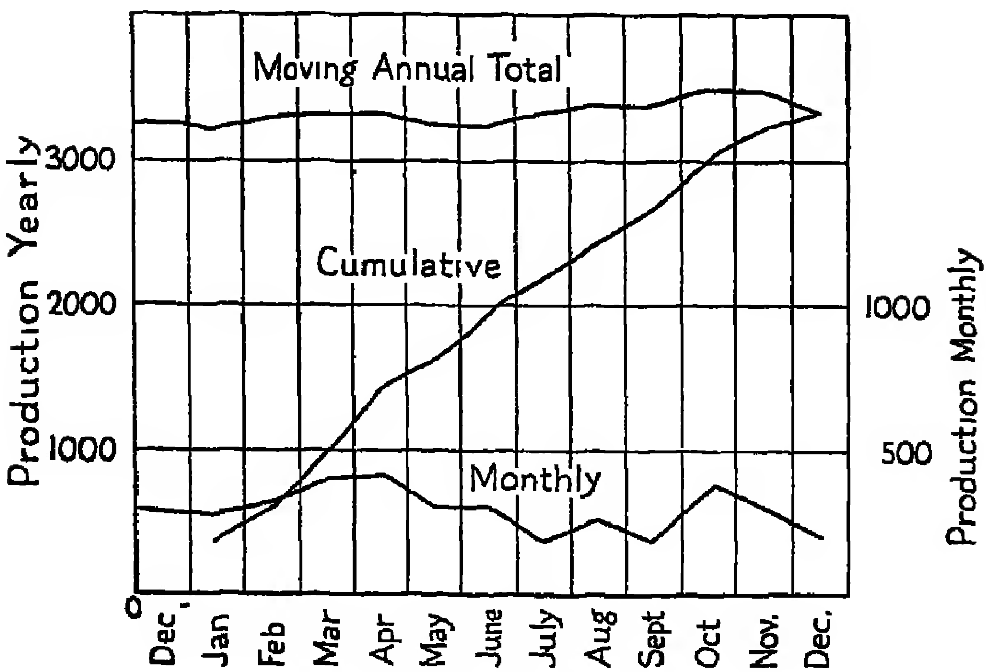

FIG 7. Z CHART

A development of historical charts is the useful Z chart, which has three curves on each chart, and, as a rule, one year's figures per sheet, as shown in Fig. 7. These curves are (1) the periodic movement of the variable, e.g. monthly or weekly figures; (2) the cumulative figures showing total to date; (3) the moving annual total: as each month ends the result is added to the previous annual total and the figure for the corresponding month of the previous year subtracted. Curves (1) and (2) commence at the same point, unless the scale of curve (1) is increased for convenience, and curves (2) and (3) end at the same point, like the letter Z, hence the name. The moving annual total may be looked on as a perpetual inventory of turnover. By placing the charts together the general trend over a period of years is obtained, or if on translucent paper they may be placed on top of each other for comparative purposes. The Z chart is also a good guide in forecasting.

Line charts are of two types, those showing the amount of change and those showing the rate of change. Plain charts show the relative numerical relations, and logarithmic charts represent variations in percentage.

When attention is directed to the growth or rate of change of a particular factor, it is usual to plot the data on semi-logarithmic paper. No matter on what part of the chart the lines are drawn the rates of growth are readily compared from the slopes of the curves. This type of chart may be used, for example, to show whether the sales of complete machines and of replacement parts are increasing at the same rate. It is also preferable to use "ratio" charts for forecasting purposes by extending the line representing the rate of change.

Another specially ruled graph paper is for probability charts. On probability paper any symmetrical frequency curve will plot as a straight line, and the curve for any problem can be plotted with a much smaller number of observations. It is used mainly in technical problems, but is being extended to a variety of applications, for example

in connection with time studies, to determine the total number of applicants to be examined to produce the desired selected number, or to find the probable result of an advertising campaign · is it worth while advertising for a certain time or should a contract be placed?

Calculating charts have long been used by engineers and technical men. They are designed to perform a series of mathematical calculations from simple multiplication upwards. They may usefully be extended to non-technical problems, as, for example, to determine the value of time given in an interview.

Frequency Charts and Divergence Charts

Frequency charts are coming increasingly into industrial as well as scientific use. They are used for showing the relation between two variables at a given point of time, i.e. the frequency of occurrence of certain data under specified conditions. For example, if the sales of products of different sizes are plotted in this manner, they may not only be graded in order of popularity, but the results enable a decision to be made on the size or design to be chosen for standardized production. An example is shown in Fig. 8

Another type of graphical record which is valuable for particular purposes is the divergence chart, in which differences are plotted, or divergence from the average or budgeted trend. The base line is best drawn across the middle of the paper. Attention is immediately drawn to the fact that the results are better or worse than normal. The chart is used to show differences between orders and shipments, orders and production, or shipments and production, goods ordered and goods delivered, and so on.

Gantt charts are employed in connection with the progressing of work. A Gantt chart is a progress chart showing whether production is being carried out in accordance with plan, and if not, the reason why. Comparison of performance with the plan can be made at a glance as regards both time and amount. A Gantt chart presupposes

a plan, emphasizes the importance of time in production, and automatically brings attention to the most urgent points which threaten to delay delivery promises. The executive's time is left free to take the requisite action to deal with any hold-up which may arise. The charts are of various types and may be employed for many purposes, for example, machine-record summaries, idleness expense,

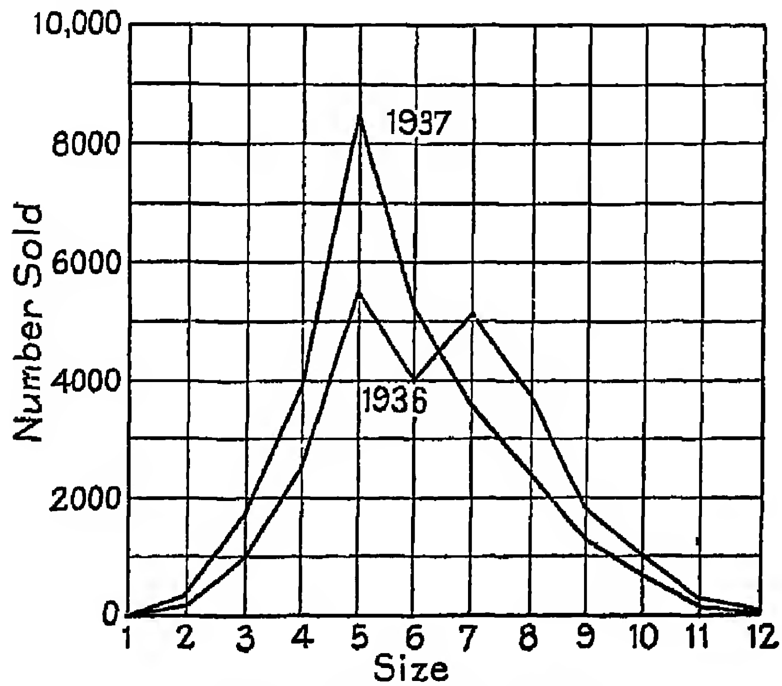

FIG. 8. FREQUENCY CHART

progress chart for a single article, work done by individual employees, man-record summaries, amount of work ahead of machines, control of operations, co-ordination of purchasing and manufacture, and so on. Their object is to measure and record the performance of men and machines with relation to a scheduled production, and they offer an important contribution to factory control. The machine-record charts, of which an example is given in Fig 9, were devised by Mr. Gantt, to provide an answer to the following questions: Are the machines all being used? Are they doing the work most needed? Are they doing it as rapidly as they ought? Idle machines are, of course, non-productive, and the use of the charts enables idleness expense to

be reduced to a minimum. The man-record charts show if the workman is keeping to a standard output, above or below it. Where a system of premium wage payment is in force they serve an additional purpose

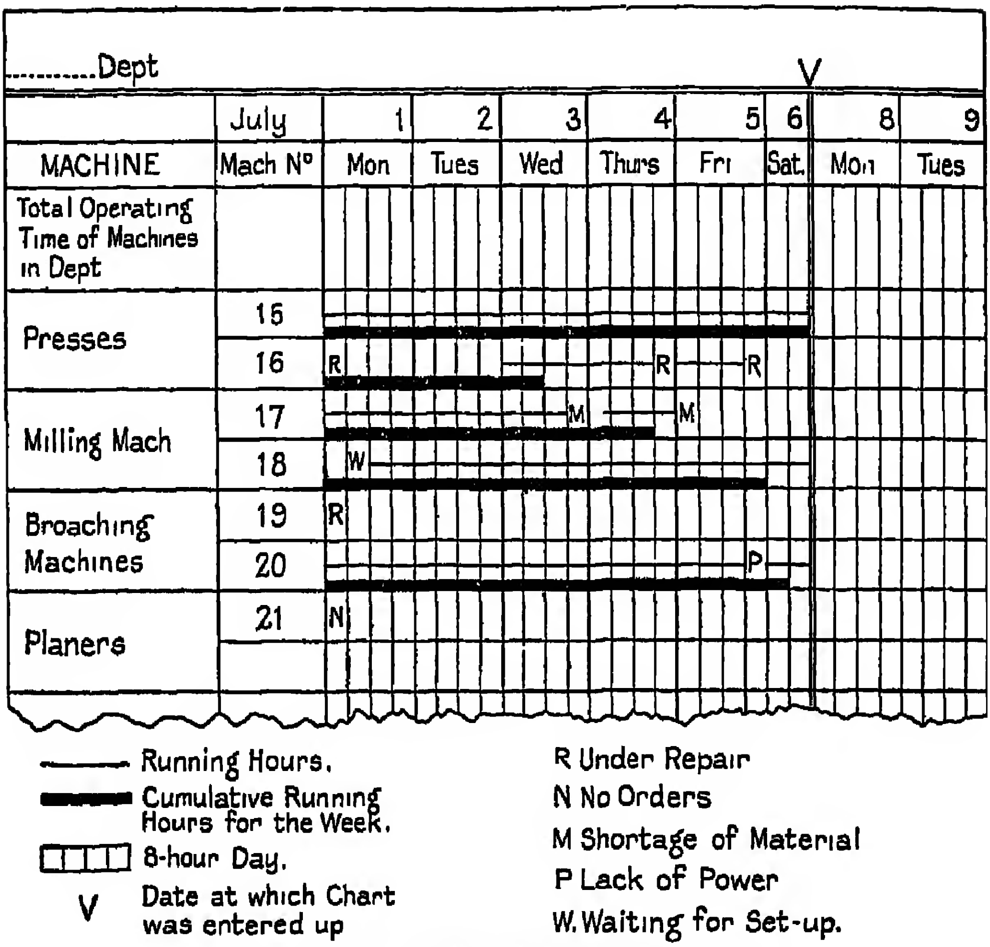

FIG. 9. GANTT MACHINE-RECORD CARD

CHART ONLY THE KEY FACTORS

It has been seen above that the presentation of statistics has assumed great importance. The important points are to know what statistics to get, how and where to secure them, the means to secure them promptly, and to whom they are to be presented in order to secure action as the result of their findings.

As regards the quantity of statistics assembled, the manager must decide how far he wishes to go in keeping in touch with the progress of the many activities of the business. They must be really essential or it is a waste of time,

and they must be promptly charted or they are of no use in control. Charts are the best means of presenting business facts and graphical control is the basis of management. Suitably chosen they show the course of the company's business, its financial position, its prospects and shortcomings. It will not be essential to present all the charts to every executive, though the same facts may be presented to different executives in different relationships which are vital to their own work.

The chief executive will require a comprehensive survey of the functioning of the organization, showing the business position and the trading and financial position, but the sub-executives will only require a summary of the results for which they are responsible, and of the other results in so far as they affect their own performance. We will first suggest some of the charts which various departmental heads may find useful—

SALES DEPARTMENT

Sales quotas
Total sales.
Unfilled orders.
Total sales expenses.
Expense of sales (expenses divided by sales)
Sales expense constituents: salesmen, advertising, office overhead.
Sales expense by product and by territory.

In the case of expenses it may be useful to express them per £ of sales ("sales pound" method).

FINANCIAL DEPARTMENT

Gross earnings, expenses, profit.
Working capital, balance sheet surplus.
Cash on hand, bills receivable, liquid assets (with minimum specified).
Liquid assets *v.* current liabilities.
Bills payable *v.* bills receivable.
Sales pound, how divided.
Stock, plus current interest.

ACCOUNTING DEPARTMENT

Total unit cost: labour, shop expense, material.
Cost *v.* standard cost.
Materials *v.* production cost.
Packing and shipping.
Budgeted and actual expenses.
Accumulative budgeted and actual expenses.
Overhead dissected as far as useful.

PRODUCTION DEPARTMENT

Production *v.* schedule production.
Production *v.* shipments.
Production *v.* orders.
Number and causes of breakdowns.
Progress charts.
Rejections.
Stock on hand, ordered and used.
Unit costs.
Time study charts.

LABOUR DEPARTMENT

Working force, applications and transfers.
Labour turnover.
Illness rate.
Accident rate.
Absence rate.
Daily wages.
Bonus curves.
Inefficiency chart for men (in hours).

Management Ratios

Other departments, e.g. purchasing, advertising, should be dealt with similarly, that is, charts constructed which meet the requirements of the particular business. The chief executive will require a record summarizing the internal and external activities of the undertaking, and for a comprehensive and balanced view of the present position and probable developments a charting system gives the most valuable aid. The significant data for the executive should be prepared in the form of three statements each accompanied by a chart.

(1) Business Position: Orders received—Current and moving annual total. Orders outstanding. Invoices issued Current and moving annual total.

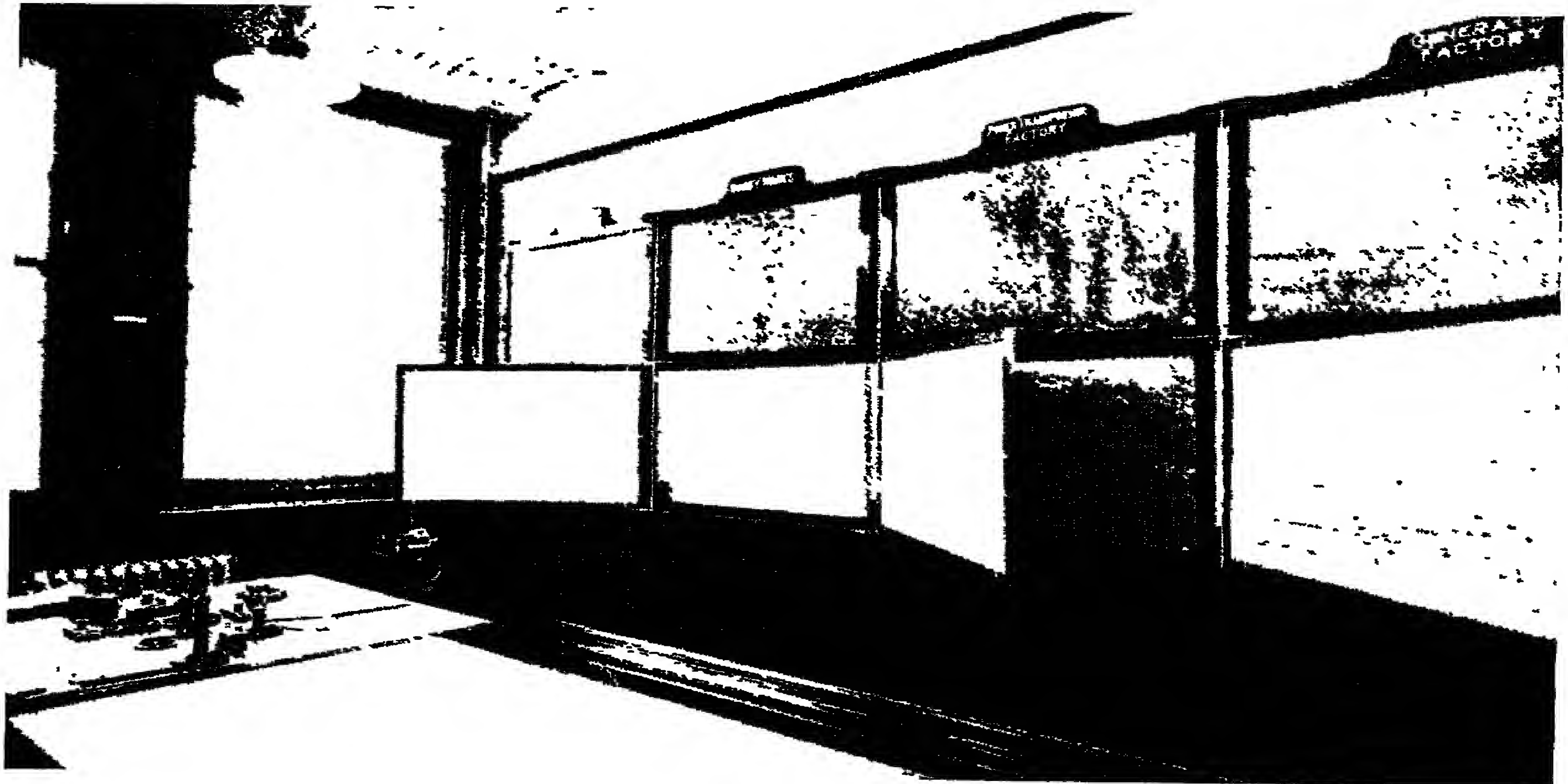

FIG 10 A VIEW OF A CHART ROOM
(By courtesy of the British Thomson-Houston Co Ltd.)

(2) Trading Position: Invoices issued (Sales) as above Net profit or loss—Current and moving annual total.

(3) Financial Position: Current and liquid assets and current liabilities. Make-up of current assets: Cash, debtors, work-in-progress, stocks.

A very brief report drawing attention to salient facts should accompany the first statement, which should be available for the management immediately after the end of each month. A fuller report should accompany the remaining statements which can be presented later, but it is clear that it is useless to wait till a month is half-way through before taking action to counter, for example, reduced turnover in the previous month.

The sales turnover and trend will have a crucial bearing on the cash position of the company. If orders are analysed for products the position will be seen as regards each department. In addition to profit and loss for each section of the firm there are certain ratios showing fundamental relationships which may also be charted, so that any abnormal ones which may be danger signals will be immediately noticed. As examples may be mentioned the ratio of profits, costs and stocks respectively to sales These ratios may be expressed as percentages of the sales pound. Whatever charts are prepared for the executive it is advisable to mark on a budgeted as well as a normal or average line, so that the controller is forced to notice what is happening.

Charting is readily combined with budgetary control by drawing on the chart the goal aimed at. Forms and charts are integral with organization, and one of their principal uses is to make clear relationships and variations. The system of chart control is now extensively used, and some firms possess chart rooms, but the system must not be overdone. A view of the chart room of an industrial organization is shown in Fig. 10 Each chart that is kept must be put to the acid test—does this chart answer the questions and provide the information required of it?

Forecasting

Wherever business men meet one hears the question: "How is business?" But even more interesting and important still is to know what is the outlook. Is it encouraging or are there indications of a decline, and is the view expressed a personal or isolated one, or is it based on a wide examination of the activities of the community? The forecasting of trade changes is highly complicated. Amid the ebb and flow of productive, commercial and financial activity how are the underlying tendencies to be determined? What signals are there to indicate the weather ahead?

Among the various methods suggested may be mentioned the Action and Reaction Theory, i.e. if business (physical volume) is above or below its normal level, a reaction is to be anticipated. There is also the theory that past experience indicates how events may be expected to occur.

The most scientific approach appears to be the Sequence Theory. It has been found that the cyclical movement of certain series of statistics precedes the corresponding movement of other series. It was shown by the Harvard Economic Service, and confirmed by the London and Cambridge Economic Service, that speculation (stock prices) precedes business (commodity prices), which precedes money prices (short rate). It may be noted here that the production curve precedes the wages curve, that industrial production fluctuates more widely than national income, and that production increases faster than employment.

Trade Indices

In addition to this general information on the course of activity, indices are required of the general movement of trade. An index indicative of total business activity is difficult to compile, but composite indices are framed to gauge the total economic activity of a country, and supplemented with a survey of representative series of the chief

industries and economic activities. Reference has been made to these trade indices which are used for broad general purposes by bankers and others, but the individual business firm is inclined to be impatient and consider them of little value in forecasting the course of its own activity. In one sense, of course, the future of an individual business is non-predictable, but if the general indices are supplemented by studying the course of the particular branch of production or trade, and also the development of the firm concerned, a valuable tool is to hand to facilitate planning the activity of the individual enterprise. The major fluctuations are forecast by the Economic Services; the minor fluctuations must be forecast by the business man himself.

A method of assessing trade tendencies is desirable from all points of view, provided too much is not read into it. A trade barometer is better used as a basis of assessment of economic movement than as a basis of individual trade activity. It may serve for short-term budgetary control in industry, but does not render unnecessary executive capacity in the individual concern.

A considerable amount of work is now being done in the collection and publication of information with a view to forecasting trade changes. The London and Cambridge Economic Service publish an index of the physical volume of production, but a total business index would have to include much more in addition, for example banking and stock exchange transactions, wholesale and retail transactions, traffic statistics.

The best-known trade barometer is *The Economist* Index of Business Activity,[1] published with the monthly trade supplement to that journal. (The index has had to be suspended since the outbreak of war as much significant data are no longer available.) The following items compose

[1] The method of construction is described in the supplement to *The Economist* of 25th July, 1936, and a record of the complete index from 1924 was given in *The Economist* of 5th November, 1938

the index, their relative weights being shown by the figure after each item—

Employment		10
Consumption of power	coal	4
	electricity	2
Transport.	merchandise on railways	4
	commercial motors in use	2
Postal receipts		3
Building activity		2
Iron and steel available for home consumption		2
Raw cotton delivered to mills		1
Foreign trade	imports of raw materials	2
	exports of British manufactures	3
	shipping movements	2
Bank clearings	metropolitan, country, provincial	4
	town	1
Complete index		42

In referring to the value of statistics in forecasting, importance must be attached to knowing the principal sources of business information, including Government publications, statistical services, journals, books and reports. *A Guide to Current Official Statistics* is issued by H.M. Stationery Office, but mention may be made of the following—

The Board of Trade Journal (monthly)
Statistical Abstract of the United Kingdom (annual).
Ministry of Labour Gazette (monthly).
Abstract of Labour Statistics (annual).
Department of Overseas Trade Reports
Statistical Summary of the Bank of England (monthly).

Also of the following—

The Economist.
The Statist.
The London and Cambridge Economic Service.
The Times Trade Supplement
Manchester Guardian Commercial Supplement.
Bulletins of the Banks, the F.B.I., etc.
Trade journals

Considering forecasting from a more limited point of view, i.e. of the individual concern, its chief advantage is that by arranging production ahead, the works can be

kept running smoothly, and the plant uniformly loaded with a minimum labour turnover. Stocks can be regulated so as not to tie up too much capital, and yet afford protection against a sudden rush. The maximum use is made of existing plant and delivery promises more exactly adhered to. New developments are anticipated and inaugurated at favourable times.

Budgeting

The budget is familiar to all as a mechanism of control in national finances. The difference between the national and the commercial budget is, however, that the former is kept down as low as possible whilst the latter looks forward to the greatest possible expansion. We have here to consider budgetary control as a mechanism of business administration.

The object of budgetary control is to set standards whereby current performance of the business may be checked and controlled to give remunerative results.

The business objective of the firm is forecasted together with the probable course of future events, from which the firm's policies are formulated and all its activities co-ordinated towards the desired goal, the actual results being compared as frequently as possible with the preconceived plan. In the business world the need for a forecast of the future is the essence of profit. Forecasting is performed by all firms even if only in the form of an unconscious estimate of the future, and with the growth of the business unit and the delegation of authority snap decisions are increasingly dangerous.

The aid to management of a clear statement of plans, and their co-ordination into a definite programme which is constantly watched for any departures from actual operation needs no emphasis. It involves not only clear thinking but intelligent action, substituting considered intention for opportunism in management. It postulates a clearly visualized goal, permits the choice from the many

paths available of the one most suited to the business, controls the rate of production and costs at all stages, and co-ordinates all the activities of the firm with no waste or leakage.

The practice of budgeting co-ordinates the operation of different sections of a business and ensures quick and correlated response to changing conditions.

Budgeting involves the specific forecasting of manufacturing, selling and financial programmes for the operation of a business over a definite period. From the market surveys and analysis of past performance, limits of expenditure are established for each function. The individual budgets are combined into the financial budget, and estimates are made of the limits for expenses and volume of sales at which the point of no profit or loss occurs. Departure from the predetermined plan will cause corrective measures to be put in hand immediately. Of course, the shorter the period covered by the budget the more accurate it is likely to be.

The period chosen will depend on the nature of the business, whether cyclical, seasonal, etc., but a customary period is a year or six months, with intermediate subsidiary budgets for a comparison of progress.

Factors influencing the question of whether the period is to be long or short include the business risk involved, the stability of the market, the production methods in use, the period required for manufacture, the methods of financing, the accounting period, and the availability of statistics.

The basic procedure in developing a budget after fixing the period is to determine the minimum profit that is considered essential, then the volume of sales in both quantity and value classified in groups, the selling and administrative expenses for these sales, the production costs of the anticipated sales divided into departments, and any additional financing which will be necessary, including the cost of any additions to plant. A tentative effort may be required before the final budget is developed.

There is no need to emphasize the importance of adequate statistics, e g. cost information must be up to date. The budget unit will evidently depend on the type of product made. Unit or standard costs facilitate budgeting.

The following definition of budgetary control has been adopted by the Institute of Cost and Works Accountants. Budgetary control is the systematic control of business operations by means of predetermined standards prepared in detail and assembled into a comprehensive programme, in order to provide a basis of comparison with actual performances and costs, with the object of reaching objectives defined in the programme.

Sales Budget

The sales estimate will be considered in greater detail in Chapter XII. The determination of anticipated sales for the period under review is looked upon as the first step of an industrial budget programme, the activity of the business being governed by the income to be earned. The volume of sales must provide a minimum income on which the firm's expenditure may safely be borne. From market analysis and the trend compared with past performance the total sales are estimated, divided into quotas for territories or salesmen. Periodic statements should be prepared showing how far estimates are being attained, and to what extent existing conditions may be expected to prevail. In order to inculcate a feeling of responsibility amongst the sales staff for the sales budget, they must be asked in advance for an estimate of their best performance during the forthcoming period, and the sales executive must give due weight to their predictions in the compilation of the budget. Some firms have a special budget committee in order to obtain the considered views of their staff The preparation of budgets is in fact a valuable education for the whole staff.

Sales expense considered from the standpoint of budgeting may be forecasted under the following classifications,

(1) constant, such as administrative salaries, office rents; (2) variable, such as commissions, shipping expense; (3) partly variable, partly non-variable, such as advertising, sales promotion.

Here, again, estimates should originate with departmental heads, and be submitted to the board for approval. Standard sales cost ratios may be established, and variations subsequently investigated. The cost of administration is usually fairly constant, and should present little difficulty in budgeting, especially if carefully classified and forecasted on the basis of past experience.

Production Budget

The chief interest of the engineer will lie in the installation of budgetary control in the factory.

The object of the production budget is to determine the cost involved in producing the budgeted sales. The forecasted costs must not exceed the expenditure allowances for every one of the works cost accounts.

The preliminary sales estimate is converted into shop requirements, output programme and deliveries.

The plant and equipment budget shows the machine requirements and whether any new equipment is necessary. Any proposed expenditure should be justified by long-period analysis.

The materials budget determines the amount of materials required, including fuel, and lays down a purchasing programme to gear with the production schedule. The most economical method of materials purchasing is worked out.

In order to control the capital tied up in raw materials and stocks, disbursements will be planned on a time basis to which the actual disbursements will be related. Inventory values, total purchases and consumption totals will be compared with the budgeted standards and attention will be thus directed to lack of economy. The usefulness of budgeting is clearest where operating efficiency is concerned, that is in focusing attention on uneconomic use of plant

and labour Some unit for production measurement has to be evolved; then a standard of production activity has to be determined. For the selected period expenditure has to be localized so as to come under the personal control of section heads of production departments and service departments. For the period in question the average cost recovery factor for each type of product in the production centres can be worked out and also the unit of production value for each class of product.

For each future pay period a total of the production value units can be made with the budgeted output for each department. When total production value units for any period are compared with the standard period they show to what extent the facilities of the factory have been used, and when compared with the budgeted expenditure the following deductions can be made. If production value units exceed the budget standard, increases may be expected under certain of the expenditure items, and vice versa. The advantage of budgetary control is to bring home to the works management the facts concerning expenditure and the use of facilities at a time when correction is at least possible and not when it is too late to do anything about it.

The labour budget expresses the budgeted production in man-hours and wages. This fixes a standard of labour requirements against which the efficiency of the shop managers can afterwards be checked. The check might be tabulated in the following form—

Period	Dept	Value of Production			Labour Cost			Ratio Labour Cost to Production Value		
		Budgeted	Actual	% Realized	Budgeted	Actual	% Realized	Budgeted	Actual	Last Month's Actual

A similar form would serve for the works oncost check, as it may readily be modified to show the effect of adjustments, for example—

FACTORY CHARGES

Oncost Item	Actual Cost	Budgeted Cost	Per cent Variation	Comments
Maintenance .				
Repairs .				
Depreciation .				
Supervision .				
Non-productive wages . .				
Electricity, etc. .				

The amount of analysis necessary for an intelligent estimate serves to familiarize department heads with all details of their operations, and to make them work out the best possible methods of passing work through their shops.

They should, of course, be furnished with statements comparing their actual performance with budgeted costs. Stabilized conditions improve the load factor on the plant and help production costs. With scientific forecasting and proper control there is not much danger of over-production and stock accumulation. Hand-to-mouth buying, however, makes production scheduling more difficult.

The works expense budget estimates the indirect charges necessary to keep the factory in operation, divided into fixed and variable expenses. An estimate of these probable overheads must be ascertained from the persons responsible.

This provides them with gauges of efficiency of utilization of plant capacity, materials purchased and labour employed, both direct and indirect.

These overheads will be based on the cost of preparedness and not allow for the cost of idleness, but it is assumed that the sales quota will fill the shop to normal activity. If orders are below this point it is not the fault of the production executives.

The manufacturing budget is only a part of the financial budget, and subsidiary to it. Even the most efficient and least-cost production methods are not by themselves sufficient to ensure the success of a business.

The amount of budgeting varies, of course, with the nature of the firm. It is greatest for stock-order concerns, and limited for those manufacturing to special orders, though in the latter case it facilitates preparations of plans and promotes quick and orderly deliveries. Standardization and simplification of the product facilitate budgeting.

Budgeting is an estimate of what the expense of running the works will be for a given production programme if certain assumed conditions hold good. Of course, such an estimate cannot be made with any pretentions to accuracy without pre-planning how the work will be carried out. Modifying conditions may, however, arise before the work is actually put through. Planning means the settling in detail of how the jobs involved will actually be done before putting them in hand. It may be objected that this involves going over some of the same ground twice, but this is not necessarily so, as attention may be limited to the divergencies between predicted and actual expenditure. In fact, this principle of divergencies is a useful one, and frequently applied in works control, e.g. where standard costs are practicable.

If there were any force in the alleged duplication it would apply to the procedures of estimating in order to tender and of costing the job after it is completed.

The Financial Budget

The budget of the company's financial programme and cash requirements is designed to interpret the planned operations of the business in terms of receipts and disbursements. It involves consideration of the amount and rate of collection of accounts and the payment schedule for wages, materials, etc. Distinction must be made between short-term indebtedness and long-term obligations. A

number of firms forecast the cash position monthly in receipts and disbursements classified according to experience. The preparation of the financial budget merely involves obtaining at the beginning of the period facts and figures usually examined at the close. By obtaining an advance picture of the effect of the manufacturing programme on cash receipts and disbursements, and on the financial structure, impending needs are clearly brought out and the efficiency of the management is increased.

An estimated balance sheet and profit and loss account, based on the anticipated trend of future business, serve as a check on the soundness of the firm's position and policy.

It may be pointed out that the practice of financial budgeting assists in loan raising, should this prove necessary.

Summary

The financial budget is based on the sales forecast, from which is deduced the expense of carrying out the works programme, and of supporting the rest of the organization, taking into account the need for new equipment and cash outgoings.

A trading programme is established from forecasted production expense and overhead expense based on estimated activity, and subdivided into periods. At regular intervals the programmes are modified in the light of current experience, up or down as the case may be, and sent to the works for the replanning of production and delivery.

The essential point is that the forecasting and budgeting machinery must definitely be the servant of the actual situation as it unfolds Budgeting creates a target for management without destroying initiative or demanding the acceptance of existing standards

The budget plays the same role from the financial point of view as scientific planning does for the works. It demonstrates the probable financial results of policies, provides

for change of plans, and sets up financial standards for judging performance, especially if based on managerial subdivisions of the organization.

It calls attention to the value of activity or capacity of working, to direct and indirect expenses and their relationship, and the efficiency of the various departments in relation to that postulated.

Plans have to be made and records have to be kept in every firm, and budgeting and its correlation with accounts facilitate the solution of many managerial problems. No scheme can be imported from outside, but must be evolved within the organization.

INSTALLATION AND ENFORCEMENT

The ease of installing and maintaining a system of budgetary control increases with the size of the organization, owing to the subdivision of functions for each of which individual personal control can be allocated.

There is an irreducible minimum of cost of installing a system, but in a simplified form it will prove an economically sound proposition even in a small plant. In any case it should be remembered that 75 per cent of the industrial output of this country comes from factories employing less than 500 workers.

The arbitrary imposition of standards on department heads without their co-operation may provoke antagonism and resistance, so that the various executives must be given an opportunity of participating and advising in the establishment of a definitely attainable budget. The conference method is frequently used, and in some cases bonuses are awarded to the executives for improvements or savings on the forecasted figures. A budget system is no stronger than its enforcement, so that regular reports are essential for indicating discrepancies, making adjustments and, where necessary, making revisions, though no change of importance should be permitted without full consideration of its effect on all portions of the budgeting system.

Budgetary control is facilitated by a comprehensive charting system on which the forecasts and goals aimed for are plotted in advance, thus providing a visual index of any divergence of achievement from the desired performance, and giving the management a projected view of the value of its policy.

FURTHER READING

(a) *An Outline of Statistics*. Samuel Hays (Longmans)
Business Statistics and Statistical Methods: Wheldon. (Macdonald & Evans.)
Chart Aids to Management: M. L. Yates. (Emmott & Co.)
(b) *Higher Control*: T. G. Rose. (Pitman.)
Business Budgets and Budgetary Control: A. W. Willsmore. (Pitman.)

CHAPTER VIII

ELEMENTS OF COMMERCIAL LAW

It is not possible to do more in the following notes than indicate the elements of the three main branches of commercial law, the law of contract, the law of agency, and the law relating to the sale of goods. Yet perhaps in no other field is the dictum "a little knowledge is a dangerous thing" so significant as in the field of law: the student interested in this subject beyond examinational needs should therefore study one of the books mentioned at the end of the chapter.

Contracts

All business firms enter into contracts, and it is necessary for every executive to have some knowledge of the law of contract, to ensure legality in his own business dealings.

A contract is an agreement enforceable at law, made between two or more persons, by which rights are acquired by one or more to acts or forbearances on the part of the other or others. The essential part of an agreement is consent; there must be a proposal and an acceptance. The two kinds of contract usually met with in commerce are—

1. A simple contract, which may be written or verbal. Consideration, which is needed to make a simple contract effective, may be defined as some profit accruing to one party or some detriment to the other when the agreement is arrived at, and usually consists of some payment.

2. A speciality contract under seal or deed, as, for example, leases of three years and over and contracts entered into by corporations. It is, of course, always a written contract. Except with contracts in reasonable restraint of trade, no consideration is required to validate a speciality contract.

A third kind of contract is a contract of record, which may be either a judgment or a recognizance and which is based on the authority of a Court of Record.

Some simple contracts must be in writing as, for example, bills of exchange and promissory notes, in some cases agreements for the sale of goods of £10 and upwards, and agreements coming within the Statute of Frauds.

The law will not enforce all contracts. An agreement may be contrary to law as in the case of an agreement to pay money in aid of an illegal purpose, or contrary to public policy, in which case it is void. A contract may be voidable at the option of one party, e.g. in the case of misrepresentation by the other party, or it may be valid in itself, but unenforceable at law, because it does not comply with the requirements of some statute.

Not everyone can enter into a contract; for example, an infant under 21 years, except in a contract of apprenticeship and service, or for the necessaries of life. Corporations and companies have only a limited capacity to contract, and their powers must be ascertained as no contract is good unless authorized in the document upon which their constitution is based.

Each party has a right to performance of the contract on the part of the other. In the case of payment the exact sum must be tendered. Other ways of terminating a contract include mutual agreement, breach, lapse of time, merger (e.g. a deed supersedes a simple contract containing the same terms), impossibility of performance and operation of law.

In the case of breach of contract, one party is released from its operation if the other fails to perform his part. An aggrieved party has a right of action to recover damages. If the amount is left to the decision of a jury, the damages are said to be unliquidated. Liquidated damages are an assessment of the amount which in the opinion of the parties will compensate for breach. The Courts will only grant an amount which can reasonably

be considered to restore the position. Interest may be allowed.

Alternatively, in the case of breach, the plaintiff may ask for—

1. An Order that the contract shall be carried out.

2. An Injunction restraining an actual or contemplated breach.

3. Cancellation of the contract.

Where the contract does not express the true intention of the parties, the Court may order its rectification on application by one of the parties.

These remedies cannot be claimed as a right, but are supplemental and discretionary, and the suitor must show that he cannot obtain otherwise a remedy appropriate to his case.

Some firms employ a contract engineer, who is virtually an inspector for the purchaser. Points to which to give attention in an engineering contract are: delivery penalties, faults in construction clause, unpaid instalment clause, guarantees, trials, insurance, alterations to contract, strikes and lock-out clause and arbitration clause.

Commercial contracts sometimes contain penalty clauses which specify a certain sum as damages if the contract is not carried out, but, as previously mentioned, in practice the amount of damages awarded is that considered by the Court to meet the needs of the case, so that the penalty clause has no meaning if the sum named is absurd.

Agency

An agent is one who is employed to do anything in the place of another. The agent puts the principal into legal relations with third parties, as, for example, when he enters into a contract on behalf of the principal. Any person who has legal capacity to contract may appoint an agent and be an agent. It is not necessary, however, that an agent should be someone who is able to contract on his own behalf.

There are three types of agent—

1. Special, with authority to do a particular act.

2. General, with authority to do anything coming within certain limits.

3. Universal, with unlimited authority.

Among general agents we may mention mercantile agents, including factors, brokers, and auctioneers.

A factor is paid a commission for selling goods on behalf of the owner. He has possession of the goods and may sell in his own name. He has an insurable interest in the goods and may pledge them.

A broker is an agent employed to make bargains and contracts for a commission called brokerage. If he buys or sells goods he does not have possession of them.

An auctioneer is a person employed to sell goods at a public auction. He is the agent of the seller and, after the sale, also that of the buyer.

An agency may be created verbally, as no formal mode of appointment is required, or in express terms. If an agent is appointed to contract under seal the authority must be under seal. Such a deed is called a power of attorney. The relationship of agency may be constituted by implication arising from the conduct of the parties, e.g. a partner has the power to bind a co-partner. In other cases, a person bound by the contract may so act as to preclude denying the agency; this is called agency by estoppel. A person may become an agent of necessity; for example, he may have to deal with another's goods in order to preserve them.

If an agent makes a contract outside the limits of the authority conferred upon him by his principal, the latter may ratify the contract, provided that the agent has acted as an agent and not as a principal. The principal, however, must be in existence at the time the contract is made; for example, a company cannot adopt a contract made before its incorporation. An agent may be answerable to a third party if he acts outside his authority, but a principal is

liable for the fraud of his agent if it is committed within the scope of the agent's authority.

The duties of an agent include—

1. He must do the work with reasonable skill and diligence, and failure to exercise them justifies a charge of negligence If he obtained the agency on the ground of special skill he must exercise it.

2. His work must be for the benefit of his principal, and he must not pay money into his own account.

3. He must not make any secret profit, or he may be dismissed and his commission sacrificed.

4. He must render accounts.

5. He must do the work himself, and not transfer it to another unless this is in accordance with business custom, the principal expressly or impliedly assents to the delegation, or the nature of the business or a sudden emergency requires it.

6. He must only use any materials and information he receives in the interests of his principal.

A *del credere* agent guarantees that the buyer will be solvent, i.e. he undertakes to pay if this should not prove to be the case, but he does not guarantee the performance of the contract in the sense of taking responsibility for any dispute that may arise.

The rights of an agent are determined by the agreement with his principal, but it is implied that he will be indemnified for losses or liabilities incurred in the course of his agency. He must be paid the remuneration agreed upon, and has a right of lien and to stop goods in transit in certain circumstances.

An agency is terminated by—

1. Agreement.

2. Effluxion of time.

3. Completion of the business for which the agency was formed.

4. Revocation by the principal.

5. Renunciation by the agent.

6. Death or insanity of the principal or the agent
7. Bankruptcy of the principal or agent.
8. Destruction of the subject-matter of the agency.

In drawing up a business agency agreement the following points should receive attention: the period of the agency, the district covered, if confined to the principal's products, the method of dealing with inquiries, the question of expenses, the degree of co-operation, whether goods are on consignment or to be stocked, prices and discounts, the supply of trade literature, the circumstances in which a breach of contract is to be deemed to have occurred which justifies the injured party in repudiating the contract, and whether the contract stands so far as it is carried out.

Sale of Goods

In a contract of sale of goods the seller transfers the ownership of the goods in consideration of payment of the price. A mere agreement to sell is simply a contract, whereas a sale, in addition, transfers the property in the goods to the purchaser. A contract for the sale of goods under £10 may be by word of mouth, in writing, both in part, or implied. By the Sale of Goods Act, 1893, if the value of the goods is £10 or upwards the contract is not enforceable unless the buyer receives and accepts part or gives something to bind the contract or in part payment, or unless some written note or memorandum is signed by the party to be charged or his agent.

It is important to fix the time when the buyer becomes owner of the goods, because the goods lie at the owner's risk. The property does not pass to the buyer while anything remains to be done to the goods by the seller.

There is receipt when the documents of title (e.g. bill of lading) have been delivered to the buyer, or the goods have been delivered to a common carrier, or have been otherwise placed at the disposal of the buyer. Delivery to a carrier is taken as *prima facie* evidence of delivery to the buyer, but the seller must exert due care and make a proper and

reasonable contract with the carrier, and in the case of delivery f o.b. must acquaint the buyer so as to enable him to insure the goods. The remedy for non-delivery is an action for damages, not compensation for extraordinary loss.

A buyer accepts the goods when he intimates to the seller to this effect or acts in a manner inconsistent with the seller's ownership, or keeps the goods an unreasonable time before rejecting them.

If the buyer justifiably rejects the goods he need not return them, but if he wrongfully refuses to accept and pay for the goods he is liable to an action by the seller for damages.

Besides delivery at the buyer's premises at the time agreed or in a reasonable time, the rights of the buyer include observance of any conditions or warranties, otherwise he has a right to damages depending on the facts. A condition is a vital term in a contract, the breach of which gives the aggrieved party a right to avoid the contract, e.g. that the goods correspond to description, are reasonably fit for the intended service, or that the bulk corresponds with a sample.

A warranty is a collateral agreement with reference to the contract, e.g. that the goods are free from charge or incumbrance in favour of a third party, or that a trade-mark is genuine. Breach of warranty gives a right to damages, but, subject to the provisions of the Sale of Goods Act, 1893, or any other relevant statutes, there is no implied warranty as to quality or fitness, and the maxim *caveat emptor* (let the buyer beware) applies.

The seller must deliver the exact quantity or the buyer may reject them. The buyer cannot be compelled to take delivery in instalments, but in the case of a contract for goods to be delivered by instalments this depends on the terms. The seller has the right to be paid at once on delivery unless otherwise stated, and subject to the time required to inspect the goods. Otherwise he may bring an action for the price. An unpaid seller has a right of lien

on the goods if in his possession, and the right of stoppage *in transitu* if the buyer is insolvent.

FURTHER READING

(*a*) *Commercial Law* J. A. Slater. (Pitman)
(*b*) *Stevens' Elements of Mercantile Law* H. Jacobs. (Butterworth & Co)
Slater's Mercantile Law R W and R H. C Holland (Pitman)

CHAPTER IX

✓INDUSTRIAL LEGISLATION

A KNOWLEDGE of industrial law is advisable, if not essential, to any works official having administrative responsibility, not only to avoid litigation, but also to safeguard the interests of the firm. It is expensive to learn the law as a defendant.

The responsibility of the works management is dual; one aspect is enforced as expressed in laws and ordinances, the other arises from a sense of duty, and will be discussed further under the Employment Department.

The legal obligations of management to employees are clear and fairly complete. To enforce these minimum obligations in regard to the safety, health, and conditions of employment of workpeople, the State has recourse to inspection, but on the whole management accepts these duties and carries them out in their entirety. In many cases it goes beyond the legal requirements, as, for example, in schemes supplemental to the State unemployment benefit and pension schemes.

Industrial legislation has consisted in making compulsory on all employers practices which enlightened employers have already voluntarily adopted. The State has not moved faster than the average employer.

REGULATION OF WAGES

Industrial legislation affects wages in several ways, among them the amount and method of payment.

In certain trades in which the workers were badly organized the wages were so low that serious privations resulted. This was the cause of the State regulation of the wages contract in these industries and the establishment of wage-fixing machinery. The adoption of the minimum wage principle in the Trade Boards Act, 1909, was the

first legislation on the subject in Europe Legislation relating to coal miners' wages was enacted in 1912, and in 1924 an Act was passed protecting agricultural workers Another class of legislation is contained in the Truck Acts, 1831 and 1896, which were passed to prevent the workmen being defrauded through the medium of payments in kind The Truck Acts have laid down that workmen's wages must be in money, not in kind, with freedom to spend where the workman likes, and that fines and deductions from wages must be fair and reasonable, and the subject of a contract between the employer and the workman.

There is also legislation providing for the correct ascertainment of wages. Two of its aspects relate to the ascertainment of the price per quantity of work done or the "particulars" principle (Factory and Workshop Act, 1895), and the ascertainment of the work done or the "check weighing" principle (Check Weighing in Various Industries Act, 1919).

Factory Legislation

To form an intelligent view of the Factory Acts it is necessary to remember that they are utilitarian accretions representing the enforcement by law of a minimum standard of working conditions in industry. The pioneers of factory legislation met with the utmost opposition to any departure from the strict doctrine of *laissez-faire* owing to the conviction that the early horrible conditions were necessary evils. The opposition to the early Factory Acts was mainly on the grounds that the general interest was best defended by non-interference.

Industrial legislation in this country has from its inception advanced along the line of least resistance. It began with children, was extended to young persons, then women, and finally to men, though of a definitely restricted scope. We have never surveyed the whole field and legislated *en bloc*.

Modern factory legislation began with the Act for the Preservation of the Health and the Morals of Apprentices,

1802 It related only to cotton mills and factories, but contained provisions concerning the working hours and minimum age of children. Visitors were appointed from the Justices of the Peace, whose reports assisted the local authorities in the administration of the Act. It was soon found that the only possibility of success in carrying out the legislation lay in the appointment of inspectors by the Government. This step was achieved in the Factory Act of 1833, when four factory inspectors were appointed with a standing equivalent to that of Justices of the Peace.

The Factory Act of 1833 succeeded in regulating the hours of workers under 18 years of age, but its main importance lay in the introduction for the first time of the system of Government inspection, which has since been copied all over the world.

An amending Act of 1844 embodied all the formal orders which the factory inspectors had issued, and withdrew their judicial functions, but gave them additional power, namely, of appointing the surgeons who issued age and health certificates. The employment of women underground was prohibited, and the hours of women in textile factories were regulated for the first time. This Act laid down the main lines of factory inspection in this country. For greater centralization of the work a chief inspector was appointed with five superintending inspectors under him, covering the main divisions of the country. In 1878 the inspectorate was reorganized and centralized at the Home Office. Women inspectors were first appointed in 1893, and the medical inspection was centralized in 1898. Since 1901 the staff has been further developed and extended.

Between 1830 and 1865 the foundations of our systems of industrial legislation and public health were laid down, and were further extended and consolidated before the granting of full recognition to trade unions in the 'seventies. Following the findings of the Sanitary Commission and expert medical reports to the Privy Council,

scientific ideas were evolved on sanitation and safety. About this period efforts were being made to provide security for the workers against the risks of their employment. Beginning with the Employers' Liability Act, 1881, provision has been made for the major risks of industrial life—disablement, sickness, unemployment, old age, widowhood.

It should be noted that factory legislation was first applied to the protection of workers in textile trades, subsequently to non-textiles, and later on regulation was extended to workshops The increasing use of machinery entailed much injury and loss of life, and compelled the passing of provisions for protecting the operatives, together with minimum standards of cleanliness and factory conditions to safeguard their health. After 1891 special rules were framed for dangerous trades and economic questions were dealt with, such as piece-work and sweated outwork wages.

The consolidating Act of 1878 raised the age of employment to ten years. The Factory Act of 1901 fixed it at twelve; it was raised to fourteen by the Employment of Women, Young Persons and Children Act of 1920.

The Factory and Workshop Act, 1901

The Factory and Workshop Act, 1901, applied to certain other places besides factories and workshops, e.g. private lines and sidings, warehouses, docks, and wharves.

Of its many sections, the parts with which the works manager was mostly concerned related to health, safety and accidents, employment, dangerous and unhealthy industries, and to particulars of the work and wages of piece-workers.

In the Police, Factories, etc. (Miscellaneous Provisions) Act, 1916, provisions were laid down with regard to health in trades of an ordinary character, including regulations with regard to drinking water, seats, washing accommodation, the preparation of meals, ambulance, and first aid.

Under the Factory Act, 1901, the fitness for employment of young persons is decided by a certifying surgeon after examination. Such surgeons, who are appointed by the Chief Inspector of Factories, also medically examine workers in unhealthy trades, and investigate certain classes of accident and industrial poisoning. Special provisions were made for protection of workers in dangerous or unhealthy industries. Some industries are subject to occupational diseases, of which notification must be given, and orders provide for the provision and maintenance of safeguards. Cases of poisoning from lead, phosphorus, arsenic, mercury, or anthrax must be notified to the Chief Inspector of Factories and the certifying surgeon for the district.

The Factory Act, 1901, dealt with wages in Section 116, in which it was made obligatory to furnish written particulars of rates of wages and the nature and amount of work to piece-workers, to enable them to compute the amount of wages due. Applied in the first place to textile factories, it has been extended to widely differing non-textile factories Particulars of the rate of wages may be furnished when the work is given out, at the time of employment, by means of a placard or, if not standard, when completed.

The Factories Act, 1937

The Factories Act, 1937, came into force on 1st July, 1938. It consolidates existing law and introduces extensive amendments. It casts its net wider than before by including all building operations, shipbuilding and engineering construction, and it abolishes the distinction between textile and non-textile factories and the use of the word "workshop" The Act makes factory law more comprehensive but at the same time simpler.

A factory becomes a place where anything is made and persons employed. It necessitated the 260,000 occupiers of factories in Great Britain making modifications in their conditions of work and premises. The Act will only be

dealt with briefly, principally in reference to the modifications it introduced into the 1901 Act.

Part I of the Act relates to health and contains new provisions in regard to overcrowding, general sanitation, and medical supervision. Occupiers of factories are liable to maintain an accepted standard of cleanliness. Dirt and refuse must be removed daily and floors must be washed weekly where more than ten persons are employed. With certain exceptions, partitions must be washed every fourteen months and repainted every seven years.

To prevent overcrowding 400 cu. ft must be allowed per person, but the height of a workroom above 14 ft. is not included Existing workrooms were exempted for five years with a possible further exemption if mechanical ventilation is installed.

A reasonable temperature must be maintained in workrooms. For sedentary workers this is prescribed as not less than 60° F. after the first hour. One thermometer must be installed in every workroom. The Home Secretary may prescribe standards of temperature or prohibit injurious means of heating.

The circulation of fresh air is made compulsory.

Lighting must be sufficient and suitable where persons work or pass, and standards of lighting may be prescribed by the Home Secretary. Glazed windows are lights and must be kept clean.

The Home Secretary may require medical supervision and treatment under special circumstances, e g. where disease occurs, where processes change and where the employment of young persons under 18 may cause injury to their health.

Where no mechanical power is used the provisions are supervised by the local Sanitary Authorities. The improvement of some health provisions by district councils leads to dual control, but a factory inspector can take action in default of the Council.

Part II of the Act constitutes a new safety code for industry. New technical matter is introduced for guarding

prime movers and transmission machinery. With regard to fencing, every part of generators, motors, rotary converters, flywheels, must be securely fenced. If an operation cannot be guarded, a device must be provided to prevent an operator coming in contact with the machinery. Transmission machinery must be provided with an efficient device by which the power can be cut off promptly. No driving belt must be allowed to ride on a revolving shaft and there must be efficient mechanical appliances to move driving belts to fast and loose pulleys.

If the Home Secretary is satisfied there is a safety device suitable for covering a dangerous part or stopping a machine he may direct it to be provided. In brief, any material or article in motion must be securely fenced. Not only the owner but the people working for him are responsible for safe working—even the employee. An inspector may decide if wilful neglect has occurred and order a prosecution. The worker's responsibility for conditions which constitute a breach of the law includes non-interference with or misuse of anything provided for his safety, health and welfare, as well as not doing anything wilfully to endanger himself or others.

No young person shall work at dangerous machines unless he has received a sufficient training in the work and is under adequate supervision Only males over 18 may examine or lubricate machines in motion. When cleaning machines there must be no risk from adjacent machinery.

In regard to new machinery, every set screw, bolt or key in revolving shafts must be guarded. Toothed or friction gearing must be completely encased. Liability for safety is extended to the seller of the new machinery, but the onus for protecting tools lies with the user.

Vessels containing dangerous fluids must be securely covered or fenced.

In regard to lifting appliances there are three sets of provisions. They must be subjected to examination periodically—six months for hoist and lift chains and fourteen

months for cranes—and the reports must be entered in the General Register. Working loads must be clearly indicated. Hoists must be incapable of opening except at landings, not move till the gate is closed, and be fitted with automatic stop and over-run devices They must be fitted with two separate ropes or chains, each capable of carrying the whole load Chains must be annealed once every fourteen months, or if less than ½ in. in diameter, or working above molten metal, once in six months.

Passages and stairs must be fitted with handrails on the open sides Floors, steps and gangways must be kept in good condition, and openings in floors fenced Ladders must be soundly constructed and properly maintained.

In guarding against dust and fumes, confined spaces must be provided with a manhole 18 in. by 16 in. Persons entering them must wear a belt and a rope passing to the outside. The breathing and lifting apparatus must always be accessible and readily inspected. Attendants must be trained in the use of artificial respiration.

No work must be conducted in boiler furnaces or flues until sufficiently cool; where explosive dust exists, the space must be enclosed and vented. No welding is to be done on explosive containers. There are special provisions concerning steam and air receivers As regards escape in case of fire proper escapes are to be provided if more than twenty persons are employed or over ten persons above the first floor. This applies in new factories if over ten persons are above the ground floor Doors must open outwards if more than ten persons are employed. New hoistways and liftways must be enclosed and made of fire-resisting materials. Proper provision must be made for an audible fire warning throughout the building if more than twenty persons are employed and free passage way allowed for everyone.

Part III contains general provisions relating to welfare, of which the following may be mentioned.

An adequate supply of drinking water must be provided

and clearly marked, and cups must be provided where the water is not supplied through a fountain. Adequate washing facilities are required in all factories in regard to which a standard will be set up. For chemical works it is one basin for five persons Adequate cloakroom accommodation must be provided with facilities for drying clothes. A standard of adequacy is to be laid down. One first aid box is to be provided per 150 persons, each box in charge of a trained first-aider. An ambulance room may be an exemption from this provision. Young persons must not carry loads more than reasonable for their strength. Seats must be provided for female workers Underground rooms may be certified unsuitable.

Part IV contains special provisions and regulations in regard to the removal of dust and fumes which becomes a duty incumbent on the occupier of a factory. Workers must not remain for meals in shops where silicious or asbestos dust occurs. This section contains provisions relating to the protection of eyes and special provisions relating to laundries.

Part V deals with the notification and investigation of accidents and industrial diseases. In a doctor's notice of industrial poisoning the factory where the worker was last employed must be specified. In future, certifying surgeons will be called examining surgeons. Certificates of fitness are required in the case of young persons employed in workshops. In the case of young persons entering industry provisional certificates may be given for twenty-one days. The local Education Authority must supply the school medical record on request.

Part VI of the Act deals with the employment of women and young persons

The normal employment period is eleven hours between 6 a m. and 8 p.m. The maximum hours per day are nine and forty-eight hours per week. The period of continuous employment must not be greater than four and a half hours and then a break must be given of half-hour for a meal. An

employment period of five hours is allowed if a ten-minute rest pause is given.

The five-day week is recognized (though not enforced), in which case the maximum hours per day are ten.

Young persons less than 16 years old must not work more than forty-four hours per week. They cannot commence earlier than 7 a.m., or work overtime.

Notices in regard to hours of employment must be placed in every workroom and changes notified.

In regard to overtime, women and young persons over 16 years may work a maximum of 100 hours per year during twenty-five weeks in the year, but if work is seasonal a total of 150 may be allowed. Overtime must not be more than six hours per week and the total hours in any one day must not be more than ten. The Home Secretary has powers to restrict overtime.

Penalties for contravening the Acts are generally increased.

The Factory Acts are administered by the Factory Department of the Home Office, except for certain provisions relating chiefly to public health, for which the ultimate responsibility lies with the Ministry of Health (Ministry of Health Act, 1919), and for means of escape in case of fire, for which the local authority is primarily responsible. Five engineering inspectors are included in the present staff of factory inspectors.

Factory Inspectors

Factory inspectors have full powers to enter any place subject to inspection at any reasonable time by night or day. To obstruct them is a punishable offence. Their duty is to enforce the Acts, and to this end they may question any employee found on the premises. Compliance with the inspector's instructions is enforced by reference to the courts of summary jurisdiction, which may impose fines up to £100.

By Special Order, certain classes of explosion, fire, and

accidents to plant or machinery must be notified to the inspector, whether they result in personal injury or not. They include the bursting of wheels, the breaking of chains or ropes, and fires which stop work for 24 hours.

There is a legal obligation on the employer to notify the District Inspector of Factories of every accident that is fatal or disables the employee for more than three days. Each factory and workshop is required to keep a General Register containing the prescribed particulars of every notifiable accident, and a yearly summary must be forwarded to the District Inspector.

The big development of industry in the south-east in recent years has been recognized by the creation of an additional inspector's division for the area.

Management should consult with the inspectors, who are experts in questions of industrial health and safety, and who are willing to advise as to the best means of complying with the law and of improving conditions of health and safety, in particular as regards modification to meet new developments.

In addition to the Factory Acts, management should be acquainted with the Notices of Accidents Act, 1906; the Workmen's Compensation Acts, 1923 and 1925; the Employment of Women and Young Persons Act, 1936; the Census of Production Acts; and the Truck Acts, in so far as they apply to factory workers, as the enforcement of these Acts lies within the scope of the factory inspector's duties.

Management must keep instructed on the group of statutes constituting the body of contemporary factory legislation, and should be in possession of the various Home Office and Factory Department publications on sanitary conditions in factories and workshops. These include the official forms for use in premises under the Factory and Workshop Acts, the Factory and Workshop Orders, and a memorandum on the structural requirements of the Factory and Workshop Acts.

Recent industrial legislation includes the following: the Employment of Young Persons Act, 1938, which protects young persons not covered by the Factories Act and Shops Act, and the Holidays with Pay Act, 1938, which provides for the payment of wages up to a maximum of one week per year. In the trades concerned the Trade Board arranges for holidays for workers proportionate to the time of employment with the employer in question.

Home Office Orders

Orders and regulations are made by the Secretary of State under powers conferred upon him by the Factories Act, 1937 These are essential features in the operation of the Act Some have replaced orders issued under the 1901 Act, some have applied specified provisions to certain industries and processes, some have modified the application of certain provisions, whilst others have given exemption from some provisions of the Act.

The latest edition of Factory and Workshop orders should be consulted, from which the student will note that they are set out under different headings, e g. health, employment, notification of diseases, dangerous and unhealthy diseases, welfare, first aid, particulars of work and wages. The following are instances of new orders quoted by way of example

No. 486. First Aid in Factories Order. Prescribed standards of first aid equipment for factories

No. 535. Young Persons (Certificates of Fitness) Rules.

No. 581. Washing Facilities (Dermatitis) Order. General washing facilities did not come into force till 1st July, 1939, but came in at once where poisonous substances were used or processes were carried on liable to induce dermatitis.

No. 598. Gasholders (Record of Examination) Order.

No 599. Chains, Ropes and Lifting Tackle (Register) Order Particulars to be entered in the registers or records of examinations of chains, ropes, lifting tackle, lifting machines and water-sealed gasholders

No 611. States uniform standards of sanitary accommodation. These are enforceable by the Local Authorities (District Councils).

No. 640 Factory Overtime (separation of different parts or acts) Regulations

No. 641 Examination of shafting and other machinery in motion for lubrication, as some cannot be stopped owing to the nature of the process Only males over 18 may be employed The conditions of appointment of these machinery attendants are laid down and the requirements that must be observed during these operations, e g the wearing of overalls and the use of appliances. A leaflet is issued for the use of such attendants.

No. 642. The provision of means for stopping promptly the transmission machinery applies to factories driven by water power as from 1st January, 1940.

No 654. Protection of the Eyes of Workers Order. Suitable goggles or effective screens must be provided in such operations as dry grinding, turning and welding of metals, fettling of castings, breaking or dressing of stone.

No 1228. Factory Individual Overtime Regulations.

EMPLOYERS' LIABILITY

When we take up the history of the subject of employers' liability, we find that at common law a servant injured by accident in the course of his employment had no recourse for damages against his master, unless either of two forms of negligence gave rise to a claim, i e. the negligence of the employer or his agent. The negligence of the employer might take the form of providing unsafe or defective machinery, or incompetent fellow servants, or of some personal act The defences raised by the employer were that the injured servant had shown contributory negligence, or if injured due to the negligence of another servant, the doctrine of common employment was pleaded. This was to the effect that the workman voluntarily undertook the risks incident to working alongside his fellows, but it was no defence if there had been on the part of the employer a breach of a statutory duty

If, however, the accident caused the death of the servant, there was no liability of the employer until the passing of the Fatal Accidents Act, 1846 (Lord Campbell's Act)

The responsibility of the employer for the safety of his workpeople, and the right of an injured employee to

compensation, have become the subjects of legislative enactments.

Safety legislation did not appear on the Statute Book till 1844, and the secure fencing of mill gearing was not brought into force till 1853. The law relating to the prevention of industrial accidents is contained in the Factory and Workshop Act, 1901; the Notice of Accidents Act, 1906, and the Workmen's Compensation Acts, 1906, 1923, and 1925.

Although accident insurance dates from about 1848, the Employers' Liability Act was not passed till 1880. This measure may be said to have been drawn up from the employers' point of view, and it was not until 1906 that the subject was covered from the point of view of the workman. In that year the Workmen's Compensation Act was passed. The business of insurance against employers' liability is carried on under the provisions of the Assurance Companies Act, 1909.

The Employers' Liability Act made the employer liable in certain cases of negligence, and deprived him of the defence of common employment, but if the workman's negligence was the immediate cause of injury, it constituted a good defence in some cases It may be noted that the term "workman," defined as anyone who has entered a works under a contract with an employer, did not cover domestic or menial servants, and it was still possible for the workman to contract out, i e. a contract to that effect was binding.

The scope of the Act is shown by the workman having a right of compensation when injured by (1) defects of ways, works, machinery and plant; (2) negligence of the superintendent or any other person in the service of the employer; (3) any act or omission of any person in the service of the employer in disobedience to rules, (4) any act of those in charge of signals, points, locomotives, trams, or engines.

It may be noted that the Act is a temporary measure which is continued from year to year.

The Workmen's Compensation Act, 1906

The Workmen's Compensation Act, which made the scope of the employer's liability much greater, codified the law to date, and applied to manual labourers and workers whose remuneration did not exceed £250 per year, though this figure has, by the Act of 1925, been increased to £350. A workman is a person who has entered into or works under a contract of service or apprenticeship, except he be a casual labourer not employed for the purposes of the employer's business, an outworker or a member of the employer's family. The Act provided an absolute right to receive compensation in certain eventualities. The employer was made to insure his workmen against injury or death, and indemnification did not involve questions of negligence. The legal phraseology should be noted, viz. that compensation is paid to a workman for "personal injury" by accident arising out of and in the course of employment. There are, however, certain qualifications Compensation is not payable if the accident is due to the workman's wilful and serious misconduct, unless the injury results in death or permanent disablement By this Act, contracting out was no longer permissible. The liability of the employer does not arise unless the workman is absent at least three days as a result of the injury. Compensation is paid to or for the benefit of the workman. Notice of accidents must be given as soon as practicable before the man has voluntarily left the employment and in any case in less than six months, as compensation only becomes due on notification. If the employer knew of the accident, defect or inaccuracy of notice is not a bar, nor is failure of notice due to mischance or absence from the country. Notice may be written or oral and must contain name, address, date and cause of accident. If so required the injured workman must submit to medical examination by the employer's doctor.

It should be observed that with certain exceptions a principal is liable to pay compensation for accidents to employees of sub-contractors.

Under this Act the contraction of certain occupational diseases constitutes injury by accident. If the disease is due to the nature of the employment within twelve months of disablement a workman has the right to receive compensation. Over thirty diseases are scheduled in the Act, and the Home Secretary may extend the list. Certain conditions attach to a claim for compensation. Notice of contraction of the disease must be given to the employer by whom the workman was engaged during the last twelve months. An examining surgeon must certify that the workman is suffering from one of the scheduled diseases. Employers must make an annual return to the Home Office on a prescribed form.

Rules of procedure for making claims and compensation for accidents are laid down by statute. Compensation for disablement is 50 per cent of the workman's average weekly earnings during the previous twelve months up to 30s. per week, but a minimum is fixed in relation to 25s. per week. The weekly payment for partial incapacity takes into account the earnings of the workman after the accident, and amounts to half the difference, but a judge may in certain circumstances order partial incapacity to be treated as total incapacity. In fatal cases a lump sum is paid equal to the man's earnings in the last three years of employment, not greater than £300 and not less than £200. Rules are given for calculating allowances for dependants, who are members of the workman's family, wholly or partially dependent on his earnings The lump sum plus children's allowances in fatal cases is not to exceed £600 In the case of insolvency of an employer, the rights of the employer against the insurers are vested in the workman. The Act of 1925 made allowance for the increased cost of living.

An employer may insure his liability under the Workmen's Compensation Act with a private company. The contract of insurance against employers' liability usually takes one of two forms in which risk is rated on a *per capita* basis, or at a percentage of the pay roll. The general

proposal form of insurance should be studied. The risk of accident is dependent among other causes on the amount of machinery used. The risks covered are in respect of a trade or business, and not domestic service.

Claims under the employer's liability for injuries to his servants are usually made under the Workmen's Compensation Act, but at common law proceedings may be still taken under the Fatal Accidents Act, 1846, or the Employers' Liability Act

The risks of employers' liability depend on the nature of the trade, the arrangements in the factory, the plans for employees' welfare, the arrangements for prevention of accidents and the procedure thereafter. Trades in which the risks are fairly hazardous include building, the iron and steel trades, wire mills, tin works, shipbuilding, manufacture of gas, and foundries Engineers' outside work is more hazardous than when carried out on the employer's premises. When insuring against employers' liability a policy may also be taken out covering employees earning over £350 per annum.

The scheme of claims and compensation is administered through the local Law Courts. Claims are settled between the company carrying the insurance and the injured workman, and the employer must not make any payment, settlement, or admission, without the written authority of the company. When liability is admitted, compensation is paid by the employer, who is reimbursed. The employer must, of course, give the insurance company due and proper notice of the accident or disease, with particulars and notice of the claim, also whether the injured worker is an insured person under the National Insurance Acts.

The Workmen's Compensation Act covers about 15 million persons, though statistics are available only in respect of about half this number. Of these, during 1937 about 2350 were killed and nearly 470,000 were injured. Fatal cases are at the present time about 4 per 10,000 persons employed, and non-fatal cases about 580 per 10,000.

Though progress has been made in guarding machines, new machines, new processes, fresh risks have tended in recent years to increase the rate of accidents. The cost is about £13 millions per year, but not more than half reaches the injured persons as net cash—clearly a blot on our social services—and workmen's compensation should be brought more in line with National Health Insurance.

The law is strictly administered and insurance companies, leaving the employers no discretion, often take every advantage of technicalities to restrict their liabilities.

The amount paid per person employed is highest in mines, followed by docks, shipping, quarries, constructional work, railways and factories. For factories the compensation paid works out at about 5s. per £100 paid in wages per annum (8s. 4d. per person employed in 1936), or probably less than 2d. per head per employed person per week. This shows how insignificant is the burden on industry as a whole.

Unemployment Insurance

The underlying basis of unemployment insurance is that involuntary unemployment is due to industrial conditions, not to the fault of the workless. It aims at providing a minimum maintenance for workers genuinely unemployed.

The law relating to unemployment insurance is contained in the National Insurance Act (Part II), 1911, amended in 1913 and 1919, and in the Unemployment Insurance Acts, 1920 to 1931, and the Unemployment Insurance Orders made under the National Economy Act, 1931, as amended by the Unemployment Act, 1934. The Act of 1911 covered 2,250,000 workers in building, shipbuilding, engineering and other fluctuating industries. The 1920 Act made the system general except for domestic service, agriculture, and certain employments mentioned below. The number of workpeople covered is over 12,000,000. All persons over the legal school-leaving age, but not in any case less than 14 years of age, must be insured if in specified employments, the category which

the engineering industry is most concerned with being that defined as any employment in the United Kingdom under any contract of service or apprenticeship. A number of employments are exempted, among which may be noted persons in the service of railway companies, public utility companies, and local and public authorities. Persons in receipt of a pension or income over £250 per annum and

NATIONAL UNEMPLOYMENT INSURANCE

UNEMPLOYMENT INSURANCE ACT, 1934

	Rates of Weekly Contribution		Rates of Weekly Benefit (waiting period 3 days)
	Employee	Employer	
	d	d	
Men (21–65)	9	9	17s
Additional allowance for wife			10s.
Additional allowance for each child			4s.
Women (21–65)	8	8	15s.
Young men (18–21)	8	8	14s.
Young women (18–21)	7	7	12s.
Boys (16–18)	5	5	6s to 9s
Girls (16–18)	4½	4½	5s to 7s 6d

dependent persons are also exempted. Agricultural workers became insured in May, 1936.

Unemployment insurance contributions are made in equal proportions by the employers, the employed persons, and the Exchequer. Rates of contribution and of benefits are shown in the table above. Unemployment benefits are paid out of the Unemployment Fund by the Labour Exchanges or Approved Societies by arrangement with the Minister of Labour. In some districts unemployment benefit for juveniles is administered by the Local Education Authority, of which the Juvenile Employment Bureau acts as local offices of the Ministry. Claims are made to insurance

officers appointed for different areas. In 1921 benefit was extended to dependants of unemployed workers.

Benefit may be drawn, subject to the conditions and disqualifications, for 156 days in a benefit year, with extension up to a whole year for claimants with good employment records.

The conditions for the receipt of unemployment benefit are clearly set forth in the Acts, including the number of contributions which must be made before a right to benefit commences and the prescribed manner of application. To qualify for benefit the unemployed person must be capable of, available for, and bona fide unable to find suitable employment.

The disqualifications precluding a person genuinely seeking work from receiving unemployment benefit include stoppage due to a trade dispute, misconduct, or leaving without just cause, being in prison or the workhouse, or being in receipt of sickness or disablement benefit, or an Old Age Pension Doubtful cases are referred to Courts of Referees representing employers and workpeople. An appeal from the decision of a Court of Referees may be made to an Umpire appointed by the Crown.

When benefit is exhausted further payments may be made (out of money provided by the Exchequer) to persons aged 18 and over provided their own means and those of their household are insufficient (see table, page 209). The circumstances affecting such cases are reviewed by the local branches of the Unemployment Assistance Board. A residue of unemployed workers, including the uninsured, have to apply for relief to the local Public Assistance Committees, whose income is derived from rates.

The powers possessed by the Minister of Labour of providing special schemes for insurance against unemployment in any industry in which it was thought that joint industrial councils might play a role have not been exercised to an appreciable extent. It has been argued that unemployment is a general risk, and it was considered that schemes

Unemployment Assistance Board's Scale of Family Needs 1936

(Subject to Household Means Test)

	Scale Rate	*Add Cost of Living Bonus (end 1939)*
Householders:		
Single man	16s	1s.
Single woman	15s	1s.
Husband and wife together	24s	2s.
Members of household		
Males over 21	10s	1s
Females over 21	9s	1s
Males and females 16–21	8s	1s
Adolescents 14–16	6s.	6d
Children (minimum for 1 child 4s) under 14 according to age	3s –4s. 6d.	6d.
Persons not in household ·		
Subject to adjustment by sex and age	15s	1s. 6d

U.A B Household Means Test (1936) Regulations

Amounts of Incomes NOT taken into account in assessing allowances

Earnings:	
Of applicant	First 3s or half total up to 8s
Of applicant's wife, husband, father or mother	As above, plus scale rate for earner
Of applicant's son, daughter, brother or sister.	
Under 18	All up to 12s plus half of excess over 12s
Over 18	All up to 20s., or 16s plus half excess over 16s.
Of other members of household	As for sons, etc., plus any further allowance deemed reasonable If earner is householder, an extra 5s. is allowed
Benefits	
Friendly Society Sick Pay	First 5s.
Health Insurance Benefit	First 7s. 6d.
Maternity Benefit	All, except additional or second benefit.
War Pension, etc	First 20s.
Workman's Compensation Allowance	Half.
Capital Assets	
£25–£300 other than ownership of dwelling	Deduct 1s per week for each complete £25.
Over £300	Deduct whole, plus income accruing

might be submitted through joint industrial councils or associations of employers and employed for insurance by industry, i e. that separate industries would themselves organize systems and relieve the State of the responsibility. Provisions were, in fact, introduced into the 1920 Act for contracting out of the general scheme, but advantage of this was taken by only two industries (banking and insurance) The provision of special schemes was removed in the Unemployment Insurance Act, 1927. The value of insurance by industries is, of course, the incentive to reduce unemployment.

Health Insurance Acts

The importance of health in industry needs no emphasis, nor the fact that expenditure on its maintenance and improvement is not unremunerative. In addition to the health requirements of the Factory Acts, health insurance of the majority of employees on a contributable basis is now compulsory.

Health insurance had been organized on a voluntary basis in the Friendly Society movement before the intervention of the State in the National Insurance Act, Part I, of 1911. There have been no fundamental changes of principle in the original scheme, which is a good example of social insurance undertaken by the State, and has been financially successful. The law relating to compulsory health insurance is given in the National Health Insurance Acts, 1911 to 1935. The Act of 1924 is a consolidating Act.

The 1911 Act brought 10,000,000 workers within its benefit. It was administered by the Insurance Commissioners until 1919, when the Ministry of Health became responsible. The Act made provision for the sickness and disablement of specified employed persons from a National Health Insurance Fund contributed to by the State, the employers and the workers. The State, which contributes two-ninths, pays the expenses of central administration.

The persons to be insured include manual workers and

also non-manual workers earning less than £250 per annum, the age limits being 16 to 65 inclusive. Certain classes are excluded, principally those for whom adequate insurance schemes were in operation before the passing of the Act. Persons casually employed for the purpose of the employer's trade or business must be insured.

As from the 4th April, 1938, boys and girls who take up employment within the meaning of the National Health Insurance Act, 1936, between school leaving age and the age 16 become entitled to medical benefit. This was laid down in the National Health Insurance (Juvenile Contributors and Young Persons) Act, 1937, which bridges the gap between the school medical service and National Health Insurance.

Benefits are of two types—in kind and in cash. Medical benefit consists of treatment by a medical practitioner and the supplying of drugs and medicines and medical and surgical appliances. Provision is made for maternity benefit. A panel system is employed for the conferment of medical benefit. Sickness benefit is given in money to those rendered incapable of work by a specific disease or bodily or mental disablement. If notice has been duly given in the prescribed manner and the due number of contributions made, benefit commences after the fourth day and lasts for a period of not more than 26 weeks.

Disablement benefit continues after the termination of sickness benefit. If the prescribed contributions have been made, there is no limit to the number of payments if the disablement occurs in the course of the worker's employment, but no disablement benefit is allowed if the weekly value of compensation or damages under the Workmen's Compensation Acts is equal to, or greater than, the benefit.

It is the duty of employers to enforce the compulsory provisions for insurance contributions. Stamps provided by the Commissioners of Inland Revenue are on sale at all Post Offices.

The employer is responsible for paying, in the first instance, the joint weekly contributions of himself and the worker, and may deduct the worker's share from his wages. Stamps must be affixed to the contributor's card before wages are paid. If the employer does not deduct the insured contributor's share at the right time, he has no legal right to make the deduction at all. Cards must be returned to employees on request.

Full sickness benefits are not paid until 104 weekly contributions have been made to the scheme. All benefits which an insured person may lose, due to an employer's default, are recoverable from the employer as a civil debt.

Apart from voluntary contributions, there is a flat rate for men and for women, as shown in the following table, the proportions payable by the employer and worker being fixed A special arrangement is made for low wage earners, and provisions are made for the insurance of casual workers.

NATIONAL HEALTH AND PENSIONS INSURANCE

WEEKLY CONTRIBUTIONS

See Pamphlet A, January 1936, issued by the Ministry of Health, Insurance Department

	Insured	Employer
	s d.	s d
Employed Man (16–65)	10	10
(over 65)	—	10
(under 16)	2	2
Employed Woman (16–65)	7	7
(over 65)	—	7
(under 16)	2	2
Voluntary Contributor (16–65)—		
Man earning Over £250	1 8	—
Man earning Not over £250	1 5	—
Woman earning Over £250	1 2	—
Woman earning Not over £250	11	—

The scheme utilizes for administrative purposes existing thrift, insurance, and trade societies. Bodies recognized in this way are termed approved societies and they administer all monetary benefits. Medical benefit is administered by the Insurance Committees In the case of approved societies, certain essentials must be complied with before recognition is granted, e g. that the society is not carried on for profit and affairs are controlled absolutely by its members. Provisions are also laid down for the security of the society's funds against misapplication and for freedom of action within the scope of its rules Special provisions are made for seasonal trades There are also many financial provisions which will not be, however, considered here. The National Health Insurance Fund is under the control of Insurance Commissioners.

There are Insurance Committees in every county and county borough. Members, who hold office for three years, consist of representatives of insured persons, the county or city council, and the medical profession. The Committees co-operate with medical, pharmaceutical and dental committees. Inspectors appointed by the Committees are empowered to enter any premises where the employees are contributors, to examine and inquire with a view to ascertaining if the provisions of the Acts are complied with. They may examine the occupiers and any person on the premises, and their servants must not obstruct or delay the inspectors, but furnish all information lawfully required.

Employers must, of course, acquaint themselves with their liabilities under the Acts and any Orders and Regulations which appear, as civil proceedings may be brought for neglecting to comply with them. In the event of the bankruptcy of an employer claims for contributions due possess priority.

Under the Widows', Orphans', and Old Age Contributory Pensions Acts, 1925 and 1929, the health insurance scheme is linked up with the Old Age Pensions scheme and that for the widows and orphans of insured persons.

FURTHER READING

(a) *The Condition of Britain*: (Chs. II and IV.) G. D H and M I Cole. (Gollancz.)

The Law Relating to Industry. H. Samuels. (Pitman)

(b) *Handbook to the Factory Acts and Truck Acts*: J Owner (Pitman)

The Workmen's Compensation Acts, 1925–34: W. A. Willis (Butterworth).

Unemployment Insurance H.M.S.O

CHAPTER X

INDUSTRIAL RELATIONSHIPS

ENGINEERS sooner or later find themselves in the midst of problems of labour relations, so that some knowledge of labour organization cannot fail to be useful to them

The right of organized workers to bargain collectively over wage rates is now generally recognized. A workman is expected to do with his labour what an investor is asked to do with his money, viz , unite with others of like kind. In view of the financial weakness of the individual labourer, bargaining in the true sense of the word is only possible when done in combination. Before considering trade unions, however, we may briefly refer to the device for collective bargaining in trades where the workers are not sufficiently organized to have a representative union.

TRADE BOARDS

Unemployment and poorly-paid employment are the chief factors tending to the degradation of labour, and low wages are mainly found in unskilled and unorganized trades. The outcry against sweating and improper conditions of labour led to the Trade Boards Act of 1909, which arranged for the establishment of trade boards in four of the worst paid industries for the purpose of establishing statutory minimum wage rates therein. The success encountered, including the raising of the level of wages amongst the poorest paid workers, led to an extension of the field of trade boards, as recommended in the reports of the "Whitley" Committee, by the 1918 Act to trades where no adequate machinery for the effective regulation of wages existed. They can be set up without an Act of Parliament by the Minister of Labour for any industry in which they are desirable The object is to provide an instrument of

self-government for poorly organized trades and to adjust wages on a fair basis Of course, the trade board system has its defects; the rates are not based on scientific investigations, their adjustment takes too long, and their enforcement is inadequate, but on the whole they have been productive of good results. Employers paying higher wages have gained from the removal of the competition of unscrupulous employers Hours of labour have been to some extent reduced. Although trade board effects may be overruled by more powerful economic processes, it appears to be generally conceded that the boards have been ameliorative in trades where wages are very low. Trade boards may also be considered a part of the existing machinery for preventing trade disputes. The policy of the Government in the administration of the Trade Boards Acts was given in a leaflet published in 1922 subsequent to the report of the Cave Committee of Inquiry into their working and effects.

The principle that the State may in justice to individuals in certain employments find it desirable and necessary to fix certain legal minimum wages has also been established in the Coal Mines (Minimum Wage) Act, 1912, by which wages were to be fixed by the joint district boards, and the Corn Production Act, 1917; the latter, which provided for the fixing of minimum wages by national and district agricultural wages boards, was, however, repealed, but another Act was passed in 1924.

Development of Trade Unions

The most important application of collective bargaining refers to the negotiations between trade unions and employers' associations. We have seen that trade unions arose or were primarily organized to strengthen the bargaining power of the workman, as the employer is a combination in himself, and can live for a longer period than the workman if business is stopped. The workmen, therefore, formed combinations to provide funds and protect

the standard of life. Trade unions may be defined as continuous associations of workers employed in a trade or trades formed for the purpose of improving their working conditions and increasing their remuneration. This distinctive form of working-class organization has evolved since the Industrial Revolution. Most trade unions are also great trade friendly societies, in which mutual insurance plays an important role.

Not much more than a hundred years ago any form of labour organization for the purpose of reducing hours, regulating conditions, or increasing wages, was unlawful, and prohibited by the Unlawful Societies Act, 1799, the Combination Act, 1800, and the Seditious Meetings Act, 1817. Although after the repeal of these Combination Laws in 1824 all criminal liability was removed and labour combinations were permissible in theory, under an Amending Act of 1825, new offences of molestation, intimidation, threats, and obstruction, were introduced, and in actual practice workmen acting in combination had little chance of pleading their cause with satisfaction or success in a court of law. This Act made a trade union criminal at common law as being a conspiracy in restraint of trade. Seventy years ago trade unions were still regarded as a social danger; in fact the modern era of industrial relations did not begin till about 1871. Since that time, however, the movement has so developed that labour now has nearly all the industrial and political machinery necessary to safeguard and preserve its interests. Trade unions have even influenced the character and development of the management of works.

OBJECTS OF TRADE UNIONS

The objects of trade unions are multiple, the principal being to secure improved conditions of employment, higher wages, and shorter hours, by agreements if possible, through conciliation and arbitration, or, in the last recourse, by means of strikes and boycotts. To assist in the attainment of their purpose they may seek to restrict entrance

to the trade and to enforce apprenticeship regulations, though less attention is now paid to this point on account of the ease of evasion and the increase in number of unskilled and semi-skilled workers Their policy is rather tending to inclusion instead of exclusion, and there is a tendency to accept juveniles into membership of trade unions. They favour standardized methods of work or processes and endeavour to get established uniform or standard rates of pay. They desire to fix a normal working day, with little or no overtime, and to control the working speed and output of their members. Trade unions take an active interest in politics and have taken a leading, if indirect, part in the passing of labour legislation. Although mainly concerned with safeguarding or improving the economic conditions of the workers and protecting the privileges of their trade, the unions have a further important function, one of their earliest, in connection with insurance and acting as friendly societies in the maintenance of sick-pay, unemployment, and funeral benefits.

The organization of trade unions has reduced the number of local or sectional strikes, though increasing the possibility of complete industrial stoppages, and simplified the process of negotiation and settlement of disputes. It has been urged that they tend to produce a dead level of mediocrity among workers, and that they unduly restrict output, but it is difficult to maintain economic arguments against trade unions except in so far as they constitute a restraint of trade. In their endeavour to protect the slow worker they are open to the charge of setting a standard which is obviously the minimum. They should certainly be on their guard to see that their gains are not made at the expense of others. Whilst, for example, they may succeed in regulating wages, they cannot fix or regulate prices, which depend mainly on demand and supply, and in connection with which the effect of foreign competition cannot be ignored.

The power of trade unions to determine wages depends

in fact on the earnings of industry, for an insistence on wage levels which prevent the earning of profits will simply lead to a cessation of production. Under private enterprise wage rates are inevitably subject to profits, hence, so long as the profit motive dominates production, unions must seize the opportunity of getting wage concessions when business is on the up-grade.

Trade Unions in Engineering Works

The origin of trade unions in engineering works is not known. A number of rival trade societies seem to have first developed, which subsequently attained some degree of unity. In 1836 a strike of eight months' duration secured a reduction of hours to sixty per week in engineering works, with extra remuneration for overtime. The movement towards a national amalgamation was initiated by William Newton, an ex-journeyman of the Steam Engine and Machine Makers' Society, in which he was assisted by the secretary, William Allen. In 1851 the Amalgamated Society of Engineers was formed and began to agitate against overtime. A lock-out resulted in a defeat of the men, but during the next ten years the membership of the union doubled. In 1871 a strike was begun to secure a nine-hour day. A Nine-hour League was formed and led by John Burnett, who subsequently became general secretary of the A.S.E. Victory fell to the men, and a 54-hour week became general in the engineering trades, though this has, of course, subsequently been reduced.

The Trade Union Act, 1871

In 1871, also, the Trade Union Act was passed, which removed certain civil disabilities. A combination was no longer unlawful by virtue only of one or more of its purposes being in restraint of trade. The definition of a trade union given in the Act is of interest, viz. any combination, whether temporary or permanent, for regulating the relations between workmen and workmen, workmen

and employers, or employers and employers, or for imposing restrictive conditions on the conduct of any trade or business. Strikes, which were no longer unlawful by being in restraint of trade, might, however, still constitute a conspiracy at common law, and the agreements of the unions giving effect to their restrictive aims were legally unenforceable.

In 1875 unions became completely legalized, and in 1876 the Trade Union Act Amendment Act was passed by which a trade union might act as a friendly society within the meaning of Section 28 of the Friendly Society Act of 1875 Provision was made for the registration of trade unions which conferred certain advantages, but also imposed certain duties upon them. Rules were also provided for the amalgamation of trade unions. A period of struggles between rival engineering unions followed. Strikes for an eight-hour day occurred in 1897. In the struggle which followed the A.S E. was defeated, but in the following year, as the result of the investigation and labours of the Board of Trade, an agreement was signed between the masters' and men's organizations, which in subsequent revisions contained slightly more favourable terms to the unions. In 1899 the Federation of Trade Unions agreed to the pooling of funds in industrial struggles.

Acts of 1906 and 1913

The trade unions did not increase their power without heavy opposition from the employers, who, while they welcomed the simplicity of dealing with authoritative bodies yet were fearful of the effects on their profits of the demands of organized labour. Two major attacks were made on the unions in the early part of this century. In 1900 in the Taff Vale case unions were held liable for losses caused to employers through strikes, and in 1908 the Osborne judgment restrained unions from using their funds for political purposes, thus attempting to cripple the nascent Labour Party The Trades Disputes Act of 1906 reversed the Taff

Vale decision and laid down that in the case of trade disputes, an act done in agreement or combination was no longer actionable unless it would be so if done by an individual. Peaceful picketing was made lawful and the liability for interfering with another person's business was removed to the extent that in trade disputes persons are induced to break contracts of employment. By Section 4 of this Act, actions for tort against trade unions were prohibited The Trade Union Act of 1913 gave the unions powers to apply funds to any lawful object authorized by their constitution, including certain defined political purposes, although in the case of funds for political objects, a resolution to apply the funds had to be passed by ballot, and any member could contract out

In 1911 the National Insurance Act gave to organized labour a recognized function within the State, that is, in relation to the collection of contributions and payment of benefits for sickness and unemployment

In the engineering trades, disputes began to arise over the manning of machines, and in 1913 the A.S.E. gave notice to terminate the agreement with the employers The procedure of the engineering unions during the war years 1914–18 is of interest. In 1914 the York Memorandum, or provisions for avoiding disputes, constituted the first attempt to settle disagreements in the works where they arose. Under the exigencies of the times the unions relinquished many of the privileges and conditions which they had struggled to build up over generations, viz. shop rules and regulations and the right to strike, though the Government promised their restoration when times returned to normal The same trends are observable in 1939. The dilution of labour proceeded apace; the shop-steward (workers' representative in shop) movement arose and assumed new functions and importance The shop-steward committees tended to usurp the functions of the trade unions in taking direct action on behalf of the workers. For a time the movement gathered strength, promising to

form a permanent feature in labour organization and representation, but in the troublous industrial period following the close of the 1914–18 war, as the demand for labour and its bargaining power diminished, the shop-steward committees waned in influence.

Prevention and Settlement of Disputes

Forcing the other side to yield is a method of settling disputes which still exists, but considerable progress has been made towards more pacific methods, viz. by conciliation or arbitration. Conciliation means direct participation of the parties to the dispute. Arbitration means the imposition of a decision given by some external authority specially appointed. It may be either compulsory or voluntary but the trade unions have always opposed compulsory arbitration Conciliation involves mutual understanding and agreement, and for some time past conciliation boards and joint committees have been utilized in the chief industries with or without a neutral chairman. It should be noted therefore that conciliatory machinery grew out of existing organizations of employers and employed. The first legislation on the subject was the Conciliation Act of 1896, passed on the lines laid down by the Royal Commission on Labour, 1891, by which on the application of both parties, the Board of Trade might intervene as a mediator and appoint a conciliator or arbitrator. In 1911 an Industrial Council was established with the object of assisting the Board of Trade in this work, and became the Arbitration Tribunal during the war. In 1915 a Committee on Production was appointed to prevent strikes or lock-outs on Government work. The Munitions Acts, 1915–16, provided the only instance of compulsory arbitration in this country

In 1917 a report was issued by the Whitley Committee, appointed to consider means of permanent improvement in relations between employers and employed with the object of fostering a sense of association within an industry

Its recommendation of a triple organization is well known, viz. Works Committees, District Councils, and Industrial Councils in each industry, the workpeople and employers being equally represented. Seventy-three Industrial Councils were started. The recommendations of the Whitley Committee were supported in the Industrial Courts Act, 1919, under which trade disputes may be referred to the Minister of Labour who, if the interests of the public are involved, will order a court of inquiry to be opened by the Industrial Court. This power may be exerted whether the dispute has been reported to him or not, and whether it is in existence or anticipated. The consent of the disputants is not necessary. Any persons who appear to the Court to have a knowledge of the dispute may be made to give evidence on oath. Nearly one-half of industrial disputes are compromised. Of the balance more result in favour of employers than of employed. In the engineering industry the equivalents of the two types of councils mentioned already existed under the form of local and central conferences, and the steadiness displayed by this industry was not unconnected with the mutual agreements that were arrived at. The work of the Joint Industrial Councils has tended to standardize wage rates, hours, and working conditions

Memorandum on Managerial Functions

In 1921 the Amalgamated Engineering Union took steps to prevent the working of overtime, and after conferences with the employers the latter issued a Memorandum on Managerial Functions in which they pointed out that the leading principle of control had been challenged, and, the Memorandum being rejected by the members of the Union, a lock-out was enforced. Under the Industrial Disputes Act a court of inquiry was set up by the Minister of Labour, which ruled that an employer had the right to decide when overtime is necessary, but limited its extent to 30 hours per week. It also ruled that the workmen had

the right to be consulted before any proposed change in working conditions was introduced.

In 1922 an agreement was arrived at between the Federation and the Union defining the relationship between employers and employed.

The utility of the friendly-society activities of trade unions was confirmed in the National Health Insurance Act of 1924, by which any trade union or branch thereof may be constituted an approved society provided it complies with the requirements of the Act relating to approved societies.

Combination Among Trade Unions

One of the features of trade unionism in modern times has been the tendency towards combination to meet and face, with more chance of successful bargaining, the large capitalistic combines and trusts which have developed in industry. In the earlier periods of trade union history the tendency was for every section of workers with its own particular ends and policy to form an association limited in size and power. In fact, until the end of the nineteenth century the typical union was a small specialized group of craftsmen. To-day the large unions have hundreds of thousands of members, due partly to the growth of general labour unions and partly to the development of the industrial type, i e. a union of all the working force in one industry. The typical present-day union is the national union with branches all over the country and a head office in London or some provincial city if the industry is localized. Concentration and amalgamation were developed relatively late, and the apparent weakness of control of the directing powers of the movement is largely due to this, together with the fact that by the time the principle of combination was properly appreciated, a few powerful groups had already been formed which were jealous of their privileges and position. Combination has taken place along two lines, viz. amalgamation or union between related trades, as in

the Amalgamated Engineering and Allied Trades Union, and federation or combination between different trades. The Miners' Federation has acted in recent years with sufficient unity to be regarded as an industrial union. By the Trades Union Amalgamation Act of 1917, any two or more unions may amalgamate if, on a ballot being taken, at which a minimum of 50 per cent of the members vote, a majority of at least 20 per cent in favour is obtained. We may also note "employment" unionism, of which we have a case in unions of municipal employees and which cuts across the principle of both craft unionism and union by industry. General labour unions dating from the time of the Dock Strike in 1889 are not necessarily confined to unskilled workers.

The final stage in combination was the formation of the General Federation of Trade Unions for the purpose of concerted action and the benefit to be derived from a large central fund. Besides rendering financial aid, the General Federation acts in an advisory and mediatory capacity. It may be said that large and highly efficient organizations have tended to make trials of strength less frequent. Representative government is customary in trade unions. Questions of policy are usually decided by a conference of delegates and the carrying out of that policy is entrusted to a body known as the executive. Every union requires some form of centralized control, and with the growth of industrial unions the question of government becomes of greater importance. The more widely scattered an industry is, the greater must the freedom of action of the executive body become. Trade Councils are local federations of all bona fide unions in the area which will affiliate. They discuss political as well as industrial questions, and render practical service to the movement

The Trades Union Congress constitutes an official annual gathering of the chief unions, and deals with resolutions affecting the cause of labour in general. It has been noted that the unions use politics as one of their normal

methods of advancing their aims The Labour Party was supported and ultimately dominated by the T.U.C. through a realization that a direct voice in Parliament was necessary for labour to be adequately heard. The T.U.C., however, though it may render lip-service to Socialism, is essentially concerned with the maintenance and improvement of trade union power and conditions of work within the existing capitalist system. Whether it can be successful is another matter. Political agitation is utilized to a greater extent on the Continent, where cartels have tended to render strikes relatively ineffective

Trade Union and Trade Disputes Act, 1927

With regard to political action, we have noted that the Trade Union Act of 1913 introduced the principle of contracting out. As a result of the General Strike, 1926, a change was made by the Trade Union and Trade Disputes Act, 1927, which altered the principle of contribution to political funds to that of contracting in, viz. that no unionist is obliged to contribute unless giving notice of his willingness to do so. This Act was the first successful legislative attack on the trade union movement since the Anti-Combination Laws.

The position with regard to the right to strike, as laid down in the 1927 Act, is that a strike for any object other than in furtherance of a trade dispute within the trade or industry concerned is unlawful if designed or calculated to coerce the Government, either directly or by inflicting hardship on the community. The cessation of work, other than simply from a dispute between employers and workers over conditions of work, that is, the political strike, is unlawful.

The Act thus restrains the trade unions from a general strike on any pretext, and also purports to place the law relating to strikes, picketing, and intimidation beyond question. Workers are deemed to be " within " a trade or industry if their wages or conditions of employment are

determined by the same Conciliation Board, Joint Industrial Council, or similar body, or by agreement made with the same employer or group of employers.

Clause 1 provides for the including of lock-outs in the category of unlawful acts on the same terms as those applying to strikes A new principle is introduced into British trade union law by giving power to the Attorney-General to apply to the Courts for an injunction restraining any union from applying its funds in contravention of the provisions of this Act.

EMPLOYERS' ASSOCIATIONS

In 1776 the economist Adam Smith wrote as follows "Whoever imagines that masters rarely combine is as ignorant of the world as of the subject. We seldom hear of this combination because it is the usual, and one may say the natural, state of things."

Employers' associations are not less widespread nor less powerful than trade unions, but their existence is less obvious. Their meetings, decisions, and reports, are confidential, unless special statements are prepared for publication.

We have seen that the legal definition of a trade union included a combination of employers, but the law was administered differently with regard to the two classes of combination.

About 1870 a National Federation of Associated Employers was founded, and from 1890 the growth of powerful combinations was marked. At the present time employers have organizations in almost every industry and district, which are used to strengthen and consolidate their forces and bargaining powers.

Local and national employers' organizations unite on an industrial basis, though an association rarely covers 100 per cent of the industry. Their object is, of course, to negotiate on a basis as wide as the industry itself with the workmen's organizations on all questions of wages, hours, and general conditions affecting employment All the main

industries of the country now have their separate employers' federations. For example—

The Engineering and Allied Employers' Federation
The Shipbuilding Employers' Federation.
The Federation of Iron and Steel Manufacturers.
The National Federation of Building Trade Employers
The Federation of Gas Employers.
The Chemical Employers' Federation.
The Federation of Master Cotton Spinners.
The Woollen and Worsted Trades Federation.
The Federation of Boot and Shoe Manufacturers.
The Federation of Master Printers.
The Master Tailors' Federation.
The Wholesale Clothing Manufacturers' Association,

and so on.

As has been indicated in connection with trade unions, it is easier to conclude collective bargaining agreements with larger industrial groups, and this refers not only to associations of owners but to vertically integrated combinations or trusts. In spite of the clarification and facilitation of negotiations between large organizations of employers and employed, there are, nevertheless, certain disadvantages. From the employees' point of view, workmen may be prevented from leaving one employer for another in the Federation owing to agreements not to take each other's men. The victimization of active shop stewards often takes this form. The interests of the consuming public may be altogether overlooked amid the strident claims of the powerful rival organizations.

During and since the 1914–18 war a remarkable growth in the concentration and strength of organization of capital occurred, and agreements have been reached between groups of industries.

Federation of British Industries

The Federation of British Industries is an organization embracing and representing the whole of the employing

interests in the country. It provides a means by which the industries can express their views on questions affecting industrial interests as a whole. In its own publications the Federation is said to be non-political and precluded by its constitution from dealing with questions arising out of the employment of labour. Needless to say the practice is very different, for politics cannot be dissociated from the economics of industry

With regard to the qualification of members, any British person or company engaged substantially in producing commodities for sale or in serving the needs of manufacturers is eligible for election, but the Executive Committee reserve the power of final decision as to eligibility.

The Federation is organized into twenty-three groups, from mining and quarrying to fisheries. Each group is divided into sub-groups, and a sub-group may represent several employers' associations. There are about three hundred and eighty sub-groups in all. Group II represents mechanical engineering, and has thirty-seven sub-groups. Sub-group 5 is entitled General Mechanical Engineering, and includes representatives of the British Engineers' Association (Inc.) and the Society of British Gas Industries. The basis of organization is by trades, not localities, every important industry being represented. The Federation represents 183 trade associations, and, it is said, about twenty thousand manufacturing firms, with an estimated capital of £6,000,000,000. As indicating the service rendered to its members the following departments of the Federation may be mentioned: Intelligence, Transport and Shipping, Insurance, Fuel Consumption, Central and Local Taxation, Artistic Design, Fairs, and Travel.

Associations in the Engineering Industry

The engineering industry is one in which great developments have taken place, and is in some respects the most complex of all. From the point of view of organization it is also highly developed as regards both employers

and workmen. The first effective association of employers was organized in 1851, when the Central Association of Employers of Operative Engineers was formed, which, as we have seen, was immediately victorious in a lock-out of the A.S.E. After the successful agitation of the Nine-hour League, a regrouping of employers' associations occurred, and in 1873 the National Federation of Associated Employers of Labour was formed, which consisted of an amalgamation of the General Association of Master Engineers, Shipbuilders, and Iron and Brass Founders, and the National Association of Factory Occupiers. In 1890 the Engineering Employers' Federation was formed, embracing in the first place firms in the industrial north, and including Belfast, and being subsequently joined by firms in the London district and afterwards by those in the Birmingham district. After the 1914–18 war the Federation had about 2,500 constituent firms, with voting power fixed on the basis of the wages bill. We may note that it was mainly through the initiative of the Engineering Employers' Federation that the Federation of British Industries was formed.

The Engineering and Allied Employers' Federation is a combination of local associations of individual firms. According to the latest available figures, the number of federation associations was forty-nine, the number of federated firms 2,164, and the workpeople represented three-quarters of a million. Provisions for the avoidance of disputes consist of discussion with officials of the Amalgamated Engineering Union in local and central conferences. An agreement of June, 1922, provides procedure in such cases, and also with regard to questions concerning shop stewards and works committees. The employers' right to freedom of management was the question involved in the disputes of 1897–98 and of 1922, and, as we have seen, was settled in the employers' favour. In a complex industry like engineering many difficult and contentious issues arise, such as freedom of employment,

the manning of machines, the selection, training and employment of operatives, the proportion of apprentices, alterations in wages, payment by results, working hours, overtime, demarcation amongst craftsmen, restriction of output, women workers, and so on. These questions have been repeatedly raised, and in view of the difficulties of reaching a formula of agreement satisfactory to both sides, the success which has crowned the endeavours of the Federation and Union, by both policy and procedure, to maintain the industry without disturbance is a very agreeable feature. In particular, with reference to the restoration of pre-1914 practices, when the industry passed through a difficult period, credit is due to both sides for the little friction caused.

In view of the abnormal conditions existing in the trade pursuant to the 1921 depression, the Federation, in 1924, invited the engineering unions to a discussion of the situation. This conference is distinguished by being the first at which the employers put forward the costs of production and value of output of individual firms in support of their case. It does not seem unsafe to assume that this precedent will be more widely followed in future in cases of suggested revision. In the meantime the unions had presented an application for a general advance in wages, which was refused. Negotiations were resumed at the instigation of the Minister of Labour, and agreement eventually arrived at in 1928.

A Memorandum of Agreement between the Engineering and Allied Employers' Federation and the Engineering Joint Trade Unions on 23rd June, 1931, defined the position as regards overtime on dayshift, nightshift, double-dayshift, and three-shift systems, and the conditions for systems of payment by results.

In October, 1939, the Minister of Labour and National Service met representatives of the British Employers' Federation and the Trades Union Congress General Council to consider the establishment of machinery for the joint

discussion of problems which confront the Government and industry during the war. It was agreed subject to confirmation by the General Council to set up a National Joint Council to advise on all matters in which employers and workers have a common interest, it being understood that the Joint Council would be purely advisory and not invade the jurisdiction of the organization in the respective industries.

Trade Associations

In modern times, instead of being subject to free competition, most trades are riddled with associations of employers which are organized to regulate and restrict competition. They vary in character and functions from gentlemen's agreements to international cartels. The former, though confidential, can be very effective, as in railway transport, banking, and oil distribution. Formal associations may regulate trade by fixing prices, regulating output, or acting as sole selling agents. A system of tendering agreements may be used as in the engineering industry. Either all the tenders may first be submitted to the association, or it may simply determine which member's turn it is to receive the order and instruct him to quote the lowest price. Another system is to allocate to each member a percentage of the total production of the association, and members who at the end of the year have exceeded their quota pay penalties at an agreed rate, forming a pool from which those members whose output has fallen short are compensated. Another type of association is the shipping conference or ring now found on nearly every trade route. It is an alliance of regular lines for restricting competition by a system of deferred rebates, i.e. the rebates are retained for some time and only paid if the shipper has confined his shipments wholly to the conference. Cartels were rarely found in this country, until the change in fiscal policy gave a large measure of protection. They may not only regulate output but act as sole selling agents for their members. A

cartel is usually registered as a company, the internal affairs and independence of its members not being interfered with. When the trade of a country is highly concentrated, it can enter an international association with a view to regulating imports and dividing up the aggregate export trade with the other constituent countries.

The formation of trade associations received an impetus from the change in the country's fiscal policy in 1932, and this relatively complete organization facilitated the introduction of control of production at the outbreak of war in September, 1939.

FURTHER READING

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CHAPTER XI

RESEARCH AND DEVELOPMENT WORK

THE value of science to industry and health has already been so clearly demonstrated that the desirability of the more intensive application of scientific method and inquiry to human affairs need not be emphasized. Such application has proved so fruitful that its future extensions may outrun all calculations.

SCIENCE AND PROGRESS

Science works by definite steps, measurement, collection, analysis and classification of facts, definition and synthesis. The application of its principles to the complex of business activities is extremely difficult, but, nevertheless, possible and necessary if continuous progress is to be achieved.

Research implies the purposeful seeking of new knowledge in any branch of inquiry. It involves the conscious application of scientific method to the disclosure of hitherto unknown facts and the establishment of relations between them, and though it has a special significance in physical science, the procedure may be adopted in any field of investigation.

The advantages to industry of participation in scientific research, and the national and economic importance of research work, have been so widely discussed that the subject requires no special pleading. Research and its results have become part of the mental atmosphere of to-day. Research really underlies all industrial progress from the earliest times and the wealth of modern societies is largely its creation. Technical innovation is an integral part of the historic analysis of economic phenomena.

Research undoubtedly promotes the material interests of the country, particularly in the development of its resources. Without experimental research there is no

certainty of progress in methods of manufacture and improvement of products

It must be remembered, however, that industry is a fly-wheel of very large inertia. Science is always ahead, but it would be impracticable and impossible for it to be the dominant partner.

Production Research

Production research may assume various forms such as a search for new forms of goods or materials or entirely new articles Improved machinery and more economical methods of production may be sought out.

In recent years strict economy in production has been enforced by relatively high wages and the desire to expand markets. The main possibilities of lowering costs have lain in the development of more efficient methods and equipment, with the result that manufacturers have realized the primary importance of supporting and actively pursuing scientific research.

We shall deal in Book II with the effects of management, standardization, and mass production in diminishing the costs of commodities, but the primary and fundamental processes and knowledge on which production is based depend on the research or discoveries of a relatively few individuals. To-day the need for research has become an accepted idea and few dream of conducting a manufacturing enterprise without the assistance of scientific research. The object of industrial research is to make a product or group of products as fine and as efficient as science can make them. No industrial firm can dispense with it with any prospects of survival, especially in this age of rapid invention.

Recourse must be had to more scientific means of production for reducing costs and increasing competitive powers. Research raises the spectre of obsolescence, but the industrialist who keeps abreast of progress need not fear it.

Research may be considered an economic weapon in the conservation of materials and forces and the development

of markets. Firms attempt by research to establish themselves in a position of virtual monopoly. With the increasing integration and combination of businesses, this virtual monopoly is more likely to be sustained than in the past.

Research is directed towards increasing industrial efficiency by eliminating waste of material, time, and effort, thus making possible a raising of the material prosperity of the community.

Investigation of the utilization of waste products and by-products may be as useful to an industry as work on the improvement of processes.

It must be remembered that a small increase in the efficiency of a machine, especially a prime mover, may involve enormous economies in actual practice. Research is therefore not only the basis for the development of our industries, but for increasing productivity and raising the standard of living.

Last century was the greatest of all time in developments in mechanical invention, in scientific discovery and the application of natural forces to the service of man, but the discoveries of the present century indicate that we are moving forward at a pace surpassing all previous records.

Research and Management

Research is not confined to laboratory investigations, but extends throughout an establishment, covers all the production processes, and opens up new outlets for the main product or its by-products. Systematic experimentation on materials improves their adaptability to manufacturing, and the influence, extending back through the source of supply, spreads out into industry. Investigation of mechanical equipment lightens labour, promotes safety, and reduces overall cost. Besides the determination of the best equipment for doing a particular job, research includes the most effective way of doing it. Research forms, in fact, the basis of what has come to be known as scientific management

Subjects which are considered in Book II, e.g. standardization, mass production, fatigue, ventilation, heating and lighting of workshops, and so on, are based on research, and the same methods of scientific inquiry and deduction should be used to study the tendencies of industrial development, the trends of various markets, and other subjects of commercial importance

The scope of industrial research is extremely wide, embracing not only materials, manufacturing processes, and designs, but also distribution and marketing of products. In addition to scientific research on the technical considerations which influence output, research is being prosecuted in other directions, viz. the problem of the human factor in industry, employment stabilization, and the most efficient forms of organization and management. Manufacturing betterment includes improvements in materials, more efficient processes, improved machines, improved transport, better working environment and improved labour relations. Management betterment includes improved relations with the works, the administrative organization and the consumers.

An executive will probably know thoroughly the conditions in his own narrow range of activity, but to determine his position in the industry, he must keep in touch with purely economic research Successful trade can only be based on an accurate knowledge of demand, so that he must have a knowledge of fluctuations due to factors not connected with his own industry. Research means working for the future, technically, commercially, and financially.

Economic research is carried on by the International Labour Office and the Secretariat of the League of Nations. Economic questions come up for international discussion and these organizations act as world clearing houses of information. Work done in the different countries is coordinated and international researches carried on to determine the tendencies, causes and effects of economic movements from which advantageous lines of action are

indicated At the same time it is unfortunate that many businesses merely use such knowledge as they can obtain of cyclical fluctuations to play the speculative game safely without much thought for the social misery in depressions.

Reference must be made to the British Management Research Groups, which are groups of non-competitive firms formed for the interchange of views and experience for raising the general level of management technique.

Pure and Applied Research

Scientific research has been defined as the investigation of the relationship between cause and effect in natural phenomena. It is at the basis of all development in human knowledge. Most forms of scientific research require the use of apparatus, and there is a tendency, as knowledge advances, for the necessary equipment to become more complex and expensive. The equipment depends, of course, upon the field in which research is being pursued. Under modern conditions it is almost impossible to achieve striking results without large expenditure. It does not follow that the larger the sum spent the more will be discovered, but we may say that the bolder the experiments the better the results are likely to be, e.g Imperial Chemical Industries, Ltd , spent £1 million on research and experimentation alone before building their Billingham hydrogenation plant.

Much of the discussion on the relative importance of pure and applied research is a waste of time. Fundamental research is a quest for knowledge without regard to the specific application of the facts discovered. If in the course of fundamental research some fact or material is discovered which appears to have technical promise, further investigation assumes a commercial aspect and becomes applied research. The distinction between fundamental and applied research is therefore one of purpose rather than the nature or quality of the work. Fundamental research as well as applied research is motivated by sound business policy.

It provides a basis for future processes and products and for the solution of complex and difficult problems by an approach other than empirical methods. Many, if not all, industrial advances are based in the last analysis on some piece of pure scientific research. This may be illustrated from the electrical industry—from Volta's purely scientific work in 1779 to the applied science of Sturgeon's electro-magnet in 1825; from Faraday's discovery of electro-magnetism to the invention of the dynamo and the industrial applications of Edison. The extension of scientific knowledge brings in its train important practical applications. Sooner or later every scientific discovery finds its use in industry. As examples of products which have emanated from the laboratory, we may mention automatic machine tools, arc and filament lamps, Diesel engines, aniline dyes, and many pharmaceutical products.

The difference between pure and applied scientific research is merely one of intention The methods and results of research purely to advance knowledge, and those of research for the purpose of facilitating industrial production and making commercial profits, are the same, and it is impossible to predict whether a research once started will prove of greater value in the one direction or the other. A happy advance of knowledge may open up a new vista to a skilled man, which allows him to see a possible solution of his own problem.

Pure research results in new knowledge which may be applied to invention, a kind of reservoir or reserve of scientific knowledge waiting application. Applied research is inspired by industrial needs, and is directed to the accomplishment of some utilitarian end. The scale of conducting the latter type of research in this country has been smaller than in the United States and, probably, Germany, and to-day is still under-capitalized. There has in the past, unfortunately, been a lack of cohesion between science and industry. The position is now, of course, being remedied Applied research is directed to ensure leadership of

production by unremitting study of existing processes An effort to solve a practical problem is often the best beginning of true research, as it soon reveals gaps in existing knowledge and unsuspected phenomena. Many important achievements have been effected in ignorance of why it is possible to accomplish them. Frequently, however, the road to practical results lies not along the obvious paths of direct attack, but along the road of fundamental research. None can foretell in what direction scientific progress is likely to benefit industry or where it will lead to.

Does Research Pay?

In times past trouble was the most frequent approach to research, and the first thing the industrialist asks is "Is it worth while? Does it yield a profit?" The business man demands positive results, and the quicker the better, but the solutions of problems are sometimes very slow to attain. The haste of commercialism must be replaced by the thoroughness of science. The problems of industrial practice are exceedingly complex, always complicated by a large number of variables, and science cannot solve any and every problem presented to it by industry. Directors expect value for their money spent on research, but they must expect it with patience. Long views and confidence are necessary. In research work the outlay has to be risked without assurance of definite reward. A definite research appropriation must be allocated for a number of years ahead independent of the oscillations of trade. Continuous research yields results sooner or later, but an advance in one branch of science may be held up for a development in some associated branch. Research is not an investment which partakes of the nature of a gamble, but a means of keeping processes and products up to date. Research is sometimes also highly remunerative. Returns on research outlay may probably not be received till after the lapse of several years, but if the research is successful, they are usually

out of proportion to the original outlay. In the pursuit of research many blanks are drawn, but the few prizes that come from time to time are immensely important. In engineering, which includes transport, mining, and many manufacturing processes, the economic benefits of research have been almost impossible to assess financially. Large profits are often the result of enterprise. Feebleness or hesitancy in planning research is likely to be as fatal as in other matters.

Individual and Co-operative Research

Academic and technical progress has in the past largely been made by individuals who were generally engaged in matters quite different from those to which their discoveries related. Until a century ago, scientific research was carried on by men of independent means, and in many industries progress came mainly from without. We all know the names of men who are land-marks in the history of science.

The genesis of most manufacturing businesses depended on discoveries or inventions by some individual who developed his original work into an industrial success. Such individuals were generally men of genius, fully acquainted with the practice or theory of the industry as it then existed. With the increasing complexity of industry, the work of development and new investigations performed in the past by an individual is being delegated to a specially organized department of the enterprise.

The pioneering work of the future will probably be done very differently from that of the past, i.e. by groups of trained men utilizing each other's scientific knowledge.

Invention has frequently resulted from empirical work, but modern research is a systematic and deliberate effort towards improvement, and the research worker of to-day has usually studied for some time the existing state of knowledge on the subject. As time goes on, innovations by amateurs are less likely to occur. Scientific knowledge

increases from the cumulative efforts and consistent application of thousands of workers whose contributions are apt to be overlooked, in comparison with the spectacular advances made in the past by a few gifted individuals.

Discovery and invention do not spring fully grown from the brains of men; the labour of a host of men, great laboratories, long and patient experiment, build up the structure of knowledge, stone by stone. Men do not suddenly discover new worlds or invent new machines or find new metals; everything is the result of a combined and gradual process of investigation.

In establishing a laboratory there are two things to be considered, the equipment and the personnel, and the latter is undoubtedly the more important. Men are more valuable than research laboratories, and it may be noted that this country produces men capable of scientific work second to none in the world

Research is essentially an attitude of mind involving the spirit of inquiry, critical intelligence, and the consideration of evidence without prejudice or bias. Fortunately, the men of this country have a native ingenuity and gift of inventiveness which have placed it in the front rank as regards great names of originators, who have added to the benefits of the civilized world. We must see to it that we do not fall behind in the race, but adapt ourselves to new and ever-changing conditions.

Research Workers

It has been said that genius is the capacity for taking infinite pains. Certainly the research worker must possess patience and thoroughness Many inventions have been due to the exertion of these characteristics in research work. If the research worker is well trained, energetic and capable, he is well, if not completely, equipped to achieve results. There is, of course, a difference between research and the attack on problems in a scientific manner. The former involves a wide outlook, imagination, and an intimate

knowledge of scientific possibilities, as well as powers of simplification, analysis, dissection, and utilization of the true methods of scientific investigation. We may also distinguish between research which involves highly novel synthesis and that which involves intensive critical revision.

The best training for research work is contact with originality. The technique of research travels almost exclusively by example and word of mouth. Effective people are not so much trained as encouraged to develop their aptitude.

The genius for original invention is rare, but the man who translates theory into practice achieves valuable work. A large number—probably the majority—of industrial research workers are engaged in refining the precision of measurements, improving the accuracy of data, working out the details of improvements, and generally consolidating our knowledge of certain fields of science. The importance of their work, though not spectacular, must not be underrated. They are not merely perfecting what has already been discovered, but spreading the use of scientific methods throughout the general practice of industry. The imaginative type of research worker who explores new fields of knowledge is extremely difficult to organize, but there is reason to believe that the work could be co-ordinated without destroying individuality. All great and original thinking is essentially individualistic but there is no reason why original thinkers should not co-operate.

A difficulty that arises in connection with industrial research relates to the distribution of the fruits of the labour of a scientific worker who is the servant of a firm or a trade. This has proved a vexed question in the past, but there seems no reason why an enlightened and equitable arrangement could not be worked out which would meet with general acceptance and approval. Encouragement and reward breed enthusiasm.

In our consideration of works organization we envisage the managing director as the ultimate control with

the principal executives working in parallel beneath him. The director of research should obviously have this status, i.e. be responsible only to the managing director. The members of the research department must be associated with the manufacturing departments and have experience therein, or they will not appreciate the difficulties involved in taking a new process or invention out of the laboratory stage and placing it on a manufacturing basis. The results of research in each field of science should be published regularly and promptly, and made available to all other workers. It is vital for a research organization to keep in touch with contemporary work, not only in its own, but in related fields. If research workers are not acquainted with what has been done by other investigators, much time and labour may be wasted. Arrangements must be made for the flow of internationally accumulated scientific knowledge into the research organization. It must also maintain effective liaison with the universities and technical institutes, the firm's sales organization, engineering department, and manufacturing department.

Caution should be exerted against trying to develop several major researches at a time. The amount of money required to develop one to finality is usually large. It has been estimated that research salaries amount to approximately two-thirds of the cost of carrying the problem through to completion.

There usually intervene a considerable time lag and the expenditure of several times the cost of laboratory research between the commencement of a research and the first payment of dividends on the money spent on its development. The sequence is the idea or germ, a new industrial development and a final manufacturing entity. The failure of many promising investigations has proved due to neglect of this factor, viz. the cost of commercializing a research. To bring a discovery to extended commercial fruition an immense amount of patient scientific work is required in close relation to actual manufacture. The time

lag between a discovery and its industrial application is, however, diminishing. For the development of new plants and methods an experimental plant has been proved of considerable utility, for to bridge the gap between laboratory and works scale requires the best scientific knowledge combined with technical skill and works experience.

Research Laboratories

The research department must be housed in a correctly designed building, and its laboratories must be liberally equipped if the best results are to be produced Its organization must be flexible and correlated with the other departments of the enterprise. On the other hand, the organization of a research department on a large scale does not necessarily or essentially lead to a large number of inventions.

Industrial laboratories may be divided into three classes—

1. Those exercising control over material and processes.
2. Those working out improvements in processes and products.
3. Those working on fundamental sciences at the basis of the industry

The first is the testing laboratory; the second is the laboratory introducing scientific control into industry, and it may be noted that the transference of a process to the laboratory makes it possible to analyse the various factors and isolate them. There is a strong tendency nowadays to bring works conditions more up to laboratory standards. The third is perhaps the most important, but can only be afforded by the very largest firms or an association of firms in the whole industry. From it may arise those fundamental additions to knowledge which give rise to new industries.

Another aspect of the work of an industrial research laboratory is maintaining a liaison with pure science, so as to apply the new scientific knowledge to the industry in question and assimilate it into the factory organization As previously mentioned, there is a considerable time lag

between the work of the pure scientist and its application to effect industrial production, and, perhaps, eventual standardization. It may be that production will have to be carried out on a small scale in the first place, while further time is consumed in investigating markets at home and abroad and creating new markets.

The Technical Information Bureau

An important section of research work is the maintenance of an information service or intelligence bureau for collecting and collating new information and distributing it to the sections or departments concerned. This involves a careful scrutiny of the scientific and technical Press, proceedings of institutions and societies, patent specifications, conference reports, and so on. A number of institutions and organizations provide a bulletin of abstracts bearing on the special fields they cover. In a particular firm the bureau must not only track down the abstracts relating to the practical needs of the firm but provide the original articles as and when required and any other technical or specialized information that may be of value to the firm. It may be mentioned that the intelligence bureau should include a section supplying the commercial department with new information and developments in economic conditions. It will suffice to mention the following subjects as illustrative: factory legislation and labour matters, statistics on raw materials and markets, trade returns, and bank reports.

The character of industrial research depends on the industry in which it is being pursued, and the industry's rate of growth and position in foreign trade. In the old or basic industries there is often a necessity to restudy them from their foundations.

The amount spent on research varies from industry to industry, being in point of fact higher in the new ones than in those old-established. It has been suggested that the amount should bear some agreed ratio to a firm's profits, but such a figure would be difficult to fix. Moreover, profits

vary considerably and may in some years not be earned at all, whereas research to be effective must be continuous. A desirable method of financing research appears to be to accumulate in prosperous years a fund and to budget for research expenditure over a period, renewing the reserve as practicable.

As regards the research of any but the largest corporations, the work is confined to the production of the firm's commodities. In the engineering industries the control of materials is of first-rate importance, and often it is included in the work of the research department, as improved materials may result in new designs and more economical products.

The relation of the research organization to the works may be described as follows. It receives new scientific knowledge from international sources, universities, and institutions and adds thereto its own contribution. It passes on such of this information as is of value to the works in the form of new and improved materials and processes and new principles of design. It also assists in the early stages of development of these, and controls any special processes until they can be reduced to standard operating conditions. The research department carries out any special investigations required by the works and will on request investigate defects and complaints. It will render all possible help in the elimination of waste and the use of by-products.

Mass production, involving the use of automatic machinery and a lower grade of labour, has brought an intensive search for even small improvements, as savings on the large number of units produced may be considerable.

Co-operative Research

Co-operation in research may refer to finance as well as conduct. Small firms which cannot support a large research laboratory may combire to maintain a laboratory or research association for the whole industry.

The last war, which altered the established streams of international exchange, served to bring about the participation of the Government in research work. But while in 1914 only forty men were in the scientific research department of the War Office, the end of 1939 saw the whole resources of science mobilized behind the fighting forces in the Research Department of the Ministry of Supply. Seventeen leading scientists and in all 800 experts work full time in the five sections of the department: explosives, ballistics and metallurgy; stores and manufacturing problems; gas defence, searchlights, sound detectors and air defence; wireless and telegraphy. The work of the department is reinforced by that of twenty-seven teams of research workers in the universities.

The trend of modern industry is such that one branch of science may affect innumerable lines of work. Many problems are incapable of solution by one branch of science alone. Exchange of ideas and knowledge is one of the most important factors in the achievement of results. There may be gaps in our knowledge which, if filled, would permit of progress in several different industries. In such cases co-operative research is not only desirable but essential. Co-operative research has the advantage that the co-operation of specialists, stimulated by their reaction on each other, may bring a more rapid solution of the problem. In America, the co-operative method of industrial research is employed a great deal.

Co-operative research is generally undertaken by producers. The formation of trade associations has favoured and stimulated collective action in regard to research. Association in research reduces cost, and the level of the whole industry is raised. Research on problems of national interest may be beyond the scope of a private firm, and are, therefore, best carried out by the State at the national institutions for research. Common research by the industry at large is recommended with respect to fundamentals.

Under modern conditions it is widely claimed that to

obtain the best results research must be effectively organized, but this must be done without destroying individual enterprise Research work must not only be well organized, but must be publicly recognized

British Research Associations

As the result of the experience of the 1914–18 war it was shown that our industries required more aid from scientific research to keep them at or above the level of achievement of their competitors abroad. Government co-operation took the form of official organizations for correlation and control of research.

The history of British research associations dates from 1915, with the establishment of the Advisory Council for Scientific and Industrial Research, the decisions of which are administered by the Department of Scientific and Industrial Research. This Department was set up in 1916, with the object of promoting the utilitarian application of scientific knowledge and methods. The Department encourages members of various industries to combine for research purposes. To commence with, a sum of £1,000,000 was voted to the furtherance of this object. It also awards research scholarships and fellowships, institutes researches, and establishes special research organizations for the study of problems of national importance.

There is in this country a large number of firms too small to carry on industrial research for themselves on an adequate scale. There are many industries, in fact, in which the most efficient unit of production is still quite small. The firms may, however, now combine and join a research association formed under the aegis of the Department. The Department is continually seeking to apply new inventions in so far as they will improve or cheapen the products of a firm or industry.

The object of the Department is to encourage industries to organize and conduct their own research, with full liberty to work out their own systems. The research boards and

committees set up include the Engineering Co-ordinating Research Board, the Fuel Research Board, the Building Research Station, and the Locomotive Experimental Station.

The various industrial research associations are bodies run by the respective industries with the assistance of the Department for the investigation and solution of problems associated with any particular industry. Some of these Associations have set up Research Laboratories of their own. The Electrical Research Association has worked out many improvements which have resulted in considerable savings in the cost of the supply of electricity. It is estimated that over £1,000,000 per year has been saved to the industry.

A research association is limited by guarantee, the members subscribing annually on an agreed assessment, and the Department generally adding pound per pound. Membership is, of course, voluntary, but a compulsory levy on profits has been suggested. To this the objection appears to be that the successful firms would be paying for those not so successful.

Large numbers of scientific workers viewed with suspicion the interference of a Government department with research work, but these doubts have been to a large extent dissipated, as the possibilities of co-ordinating industrial research have proved greater than was generally imagined. The Department has rendered valuable service in preventing the overlapping of work by different men on similar subjects. The research associations frequently co-operate in the solution of problems of mutual interest.

The Annual Reports of the Department of Scientific and Industrial Research should be referred to, as indicating the scope of the researches which the Department has fostered. The work of the research associations is described and the range of investigations covered is shown from consideration of the following list of committees:

Standards of Measurement, Alloys for Use at High Temperature, Minor Metals, Stresses in Railway Bridges, Buildings, Engineering, Gas Cylinders, Lubrication, Adhesives, Physics, X-ray Analysis, Water Pollution, and many others. The research programmes of these bodies become increasingly aimed at the early solution of some immediate need of their industry.

After contending with many outstanding difficulties these associations have accomplished really excellent work and definite technical advances have been achieved. Some differences have been felt, however, as to the kind of research which was needed, viz. the fundamental or the immediately practical type. The former is equally important for the future of British industry, but there is a gap between it and practical work which is sometimes aggravated by a lack of understanding between the scientific worker and the industrialist.

In the organization of a system of concerted action in research the need of linking up with overseas activities on imperial lines was early appreciated, and national research councils or advisory committees have been set up in the Dominions. Specialized bureaux have also been set up by imperial co-operation, such as the Mineral Resources Bureau.

Researches of the Institution of Mechanical Engineers

Engineering started as an art; at a later stage it developed a partly scientific but empirical practice. Sooner or later engineers made use of the discoveries of science but the connection with science was casual or haphazard. The Royal Society founded in 1666 was met at first with an attitude of distrust. In 1818, however, when the Institution of Civil Engineers was founded, the encouragement of research was among its objects. For some time, however, original research continued to be the task of individual scientists, who spent their private fortunes thereon or were financed by public-spirited benefactors. The year 1900

marked a turning-point when the National Physical Laboratory was founded and research began to be recognized as a question of national importance. The 1910 edition of the *Encyclopædia Britannica* contained, however, only half a paragraph on the subject.

As regards the relation between science and engineering, many problems are on the borderland of two or three sciences, and the closer the intercourse between the physicist and the chemist and the engineer, the greater will be the fertility in invention and the faster the economic progress Mechanical invention is a form of expression, and the more imaginative the engineer the more probable the novelty of conceptions, forms and designs. The invention of the steamboat, for example, was in the first place a flight of imagination in an engineer's brain. Engineering invention is in fact the greatest factor in the material phase of world development.

The Institution of Mechanical Engineers prosecutes research, through the medium of committees, on subjects suggested by its members as desirable of investigation in the interests of some section of this branch of engineering. If of interest to other scientific workers the committee may be appointed jointly with other learned societies, as in the case of the Alloys Committee. The experimentation may be carried out in the laboratories of the universities and national institutions, like the National Physical Laboratory, with the co-operation of the research laboratories of the Services and of industrial firms. The research committees issue reports from time to time. Between 1889 and 1892 the Institution carried out an important series of marine engine trials, and a joint committee, with the Institution of Naval Architects and the Institute of Marine Engineers, recently carried out and reported on a series of trials, ashore and afloat, of marine oil engines. The Institution has been a pioneer in conducting researches on such subjects as alloys (the first Report appearing in 1891), riveted joints, castings, cutting tools, friction, hardness

tests, refrigeration, gas engines, steam nozzles, wire ropes, and welding. Subjects which have been investigated include heat transmission, steam engines, steam jackets, and steel. The number of reports on a single subject have varied from one to eleven. Valuable assistance in the design and propulsion of ships has resulted from work carried out in the Froude National Tank at the National Physical Laboratory.

The work of the Institution brings together the best brains in the industry and assures scientific investigation of important problems on a systematic basis, whilst the publication of results makes the information available for raising the general level of the industry.

Although much has been done in co-ordination and co-operation of engineering research, there is, however, still no general plan and no central controlling body or clearing-house for engineering information.

Note should be made of the rise of the method of scale model testing, as in aeronautical research, the William Froude tank, the design of weirs, the effect of wind on bridges, and in the acoustics of buildings.

As indicating the scale on which research is conducted abroad we may note: (1) In the U.S.A. the National Research Council recently reported that there were over 1600 industrial research laboratories. (2) In Germany the Kaiser Wilhelm Gesellschaft administers thirty research institutions. (3) In Japan there are seventy research institutions, more than half of which are under Government auspices.

Research must be Continuous

The aim and object of industrial research is to bring benefit to industry. If differences of opinion arise they are with regard to method and not aim. The most active of our industries are those which are founded on recent research work. No industry can make progress without the continual addition of new knowledge. We must have not only research, but planning on the basis of research.

Now knowledge must be systematically sought. Research is not a last resource but an essential part of the business of production. It must never stop; no firm can retain its leadership if original work is not kept up. Expenditure on research and development work is essential to keep a firm's products on the market in advance of competitors.

The benefits take some time to appear in a profit and loss account, but apart from the financial point of view of remunerative expenditure research has a vital effect on competitive efficiency.

In the technique of change, insufficient initiative has been shown from the business end, but industrial gestation has shortened appreciably, and business is attracted and retained by the manufacture and development of new and improved products, and the future of an industry depends on its ability to do this. If our industries are to maintain their pre-eminence, research must not only be continued unabated, but vigorously intensified. There should be research for new industries to replace those already obsolete and to prevent our being outstripped by more modern industrialized countries. Research is not supported by industry; industry is supported by research.

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CHAPTER XII

ORGANIZATION OF DISTRIBUTION

THE problem of distribution is to minimize the cost of moving the service unit to the customer. Costs of production have been largely reduced by mechanizations and large turnover, continuity of production being perhaps more important than quantity, but costs of marketing have not been reduced to anything like the same extent. Marketing efficiency aims at a reduction of the ratio of price to manufacturing cost.

Distribution may be carried out by the manufacturer himself, wholesale merchants, departmental stores or retailers. The number of parties that make up the chain of distribution varies, and the same product may be distributed in different ways. The *desideratum* is to have supplies available at the time they are wanted and of the quality required by the user.

Recent changes in distribution include the development of chain stores, mail order houses and instalment selling. The manufacturer may undertake his own distribution with a view to eliminating the profits of middlemen, but encounters problems of stock financing which will be referred to below.

Industrial marketing may be made more efficient by studying the following factors in distribution—

1. Collection of information and market data.
2. Creating demand—sales promotion, advertising.
3. Preparation for sale—packing.
4. Transportation.
5. Stock holding, financing, risk bearing.
6. Reduction of marketing cost.

MARKET ANALYSIS

Mass production is dependent on volume and continuity of demand so that the development of methods to effect

volume and expediency of distribution has become necessary. In addition, therefore, to the planning of production, the exploration and accurate assessment of markets is essential. Haphazard attempts at market research must therefore be supplanted by individual departments devoted solely to such work. Market research may be defined as a way of finding out facts which must be known before a marketing policy can be determined. Statistical analysis primarily points out the lines along which further inquiry must be pursued in a more practical manner. Indications may first be sought of market tendencies in the past by examining the relative statistics. The spheres of market research are as follows—

1. Potential markets.
2. The methods of selling which must be employed.
3. The development of the marketing organization
4. Improvements in quality or design or packaging
5. The tendencies of demand

Starting from a knowledge of what type of customer uses or might use the product, an investigation is made of potential markets. In so far as practicable the basic consuming power of these markets should be determined, and an investigation made of the buying characteristics, both physical and psychological. The investigation of potential demand involves a study of purchasing powers which can be anticipated for the product in various markets.

Attempts have been made to develop indices to indicate variations in purchasing power in different sections of the market. The determination of the unit of buying power is evidently a difficult question. Knowledge of population density alone is obviously not sufficient, but relative wealth per head should be determined or, better still, information on expenditure as well as income. Considerable attention has been given to indices as an aid to market analysis in the U.S.A., where a census of retail distribution has been published giving an index of total retail sales in each town compared with the country as a whole.

Having determined the total consumptive power of different markets, an estimate should be made of what proportion the firm can economically fill, making, of course, the necessary allowances for business conditions at the time the survey was made. An intelligent plan can only be formulated for an industry as a whole, but the directors of an enterprise will have to determine their future share in the industry for the period of planning.

Market analysis may commence with a study of the present markets, which are plotted where necessary or useful on maps. This will include an investigation of the effect of price, quality, size, design, style, colour, and package on the existing demand, and comparison should be made with competitive products in each respect. It is, of course, important to know how the quality and price of the commodities manufactured compare with similar products, and to correlate this with the trend in the firm's production curve. At the same time an investigation may be carried into possible new uses of existing products and what markets may be developed for by-products.

Systematic studies permit sales forecasts to be made from which sales quotas and the sales budget are set up. Whilst it is best to take a long view with regard to sales and sales promotion costs, sales forecasts must be continually revised as information becomes available from market research.

Underlying market research is the need for a general economic knowledge of the trend of market conditions and developments in the general as well as the particular conditions of trade. This means that the sales research engineer must keep in constant touch with general economic statistics, both international and foreign, as well as those concerning his own country. The latter data may be divided into official statistics and the information given in financial and trade journals. In addition, there are general sources of information which must be followed, both legislative and that regarding social development and the rise of new

industries. From the data available it may be possible to build up a picture showing the position (*a*) nationally, (*b*) for the particular industry, (*c*) for the individual firm. It will be necessary to forecast whether the demand will be enhanced or reduced in future, whether a similar or substitute article will become available, whether there will be a transfer of demand from one area to another, or one class of purchaser to another, what will be the effect of the development of new industries, and so on.

Inside the firm's organization many departments contribute information to the market research work in addition to the salesmen, viz the cost department, the traffic department, and the production department. Questions of when people buy and from whom they buy can be answered to some extent by the travellers, whose lost-order reports are often of special value. Branch reports deserve careful analysis.

The duties and scope of the market research department are evidently the collection, sifting, extraction and presentation of data. Reports must be presented periodically, but the interpretation of data or evaluation of results is the duty of the chief sales executive, who will recommend to the Board such changes in policy as are suggested by the information obtained and the modified or revised forecasts resulting therefrom.

Market analysis indicates where to sell, product analysis shows what to sell, and the business forecast shows when and how much to sell, with due regard to seasonal influences and cyclical fluctuations, i.e. short view and long view. As regards the general trend the Z chart is frequently recommended as a mechanism for controlling sales, the moving annual total showing the direction in which results are moving.

Having set sales quotas for different markets, it is necessary to determine the best trading centres and the proper outlets to use; for example, a desirable centre may be created by the localization of specialized workers needing

the product, or a local outlet may stimulate demand, or another district may have a number of suitable retailers.

Of course, it may be more desirable to distribute direct to the customer, but this is determined by the cost of sales.

Market Development

Market development involves the building up of advance plans and carrying them into effect by means of up-to-date technique

In developing a market it is necessary to estimate the sales promotion effort required, and to watch changing conditions which may modify the effectiveness of the effort. The acceptance of the importance of market research has led to the appointment of sales engineers, who study the product not only from the technical point of view, but for marketing possibilities and services to customers. The product is subjected to critical examination with a view to increasing selling factors, not only efficiency but appeal, by ascertaining buyers' requirements, tastes, and habits. Sales engineers may criticize advertising, selling policy and methods and delivery services. They study competitors' activities and see what can be learned from them. Their services are particularly in demand in accounting for depressions in the firm's activities, whether seasonal, cyclical or from diminishing demand, with a view to suggesting correctives.

The expression "market analysis" is usually taken to relate to where the best markets are in which the manufacturer may sell, and how they are to be reached, but there are many other factors which he must study and of which it is to his advantage to keep records of vital movements.

Among these may be noted—

1. The raw materials market.

2. The market of contributory industries or semi-manufactured goods.

3. The production market or the number of producers and their total capacity.

4. The labour market, as the future development of sales may depend on the purchasing power of the workers.

5. Money and capital market. It may be noted that the position of the capital market and trading conditions abroad may considerably influence the industrial situation at home.

Watching the position and movements of the markets on the production side may be of great assistance in deducing the position of the business and the product with regard to distribution. The results of such surveys will naturally be passed on to the manufacturing and design divisions, but the information (or parts of it) may frequently prove of service to the sales and publicity departments.

Training Sales Personnel

In the field of scientific management psychological tests and selection of personnel have an established position. They should be applied equally to problems of distribution. The sales representative should have certain personal traits such as optimism, perseverance, tact and sociability, as well as a thorough grounding in product knowledge. It is desirable that representatives should have had experience in the works as well as commercial knowledge. Time studies should be used in selling as well as in production to determine what are the points at which loss and waste of time occur. The salesmen's time and effort must be organized.

With a view to promoting personal efficiency in representatives it is desirable in sales direction to have agreements by which each covers a territory exclusively, and which, in addition to clauses covering salary and travelling expenses, contain a payment-by-results factor, so that commission is paid on profitableness of the turnover, or on some basis at least more equitable than mere volume of turnover. In the latter case representatives naturally give their attention to lines which are easy to sell.

Developing Foreign Trade

Systematic and specialized studies are particularly necessary in developing export markets. Foreign and home sales departments must be kept separate as export trade is highly specialized. In doing business abroad it is of great importance to establish the right kind of representation. If contact is not already established a careful estimate will have to be made of the cost of doing business abroad, and this will necessitate sending out an executive official, though a good deal of information can be obtained from the Department of Overseas Trade, Trade Associations, the Federation of British Industries, and the British Consuls. The choice of representation lies between local agents, travelling representatives, and branch companies. The first have advantages in connection with language and understanding of regional psychology, but it is generally best to appoint a technically qualified British representative, who knows the language, but with native assistants. The technical qualification is, of course, necessary in order to understand causes giving rise to complaints, and to assist development and pioneer work in the foreign market. The representative must be adept in obtaining early knowledge of pending contracts. Contact with the home office must be maintained by visits both ways. In financing foreign trade there are the services of the Export Credits Guarantee Department, which for a premium on an insurance basis will guarantee payment of approved exports.

Advertising

Advertising is an important factor in sales promotion. It must be carefully planned and tested, if possible, with reference to the market.

Analysis of the market is essential to planned advertising, as it will have shown how big the market is, what competition there is, and what are the key influences affecting the sales. It is also assumed that a survey will have been made of the distributing channels to ascertain the approximate

proportion of trade passing through each. The next step is to determine what media shall be selected. Direct forms of advertising give no information to competitors, but Press advertising builds up prestige. It is significant that though the present war has obliged some firms to suspend production for the general market, they continue to advertise their product in order to retain the goodwill of the public pending the resumption of civil production. Modern advertising tends to become informative and to dispense with the best-ever type. Collective or co-operative advertising avoids waste.

When the plan is drawn up, the cost to execute it must be determined and passed by the directors. An estimate must also be made of the time that will elapse before the objective is reached.

Finally, the results must be checked in relation to the share of the market obtained and the sales achieved per £1 spent in advertising.

The chief point is to plan and control the results of publicity as well as of salesmen's efforts.

PACKING

Apart from freedom from breakage and faults in transit and ease of handling, packing frequently requires close consideration to impart attractiveness to distinctive classes of goods. Some goods, in fact, sell on appearance and novelty in packing. Packaging has, in fact, become a specialist study, involving the employment of commercial artists and a knowledge of the new packaging materials.

The problem of transportation is to choose the method giving the minimum freight cost. Markets are limited by freight rates, and cost of transport is frequently the fundamental factor in the competition between different producing areas.

Water transport is generally the cheapest. The magnitude of the coastwise transport in this country is frequently not appreciated, and our canal system could be modernized

with advantage. In 1936–7 the London-Birmingham Grand Union Canal was in fact modernized at a cost of £1 million. Rapid transport is, however, the note of the times as illustrated by the increasing air traffic. Fast transport reduces, of course, the necessity for local stocking. The problem of road *v.* rail delivery can only be decided on the facts. The former has the advantage of no transhipment. Most works have, however, their own sidings, and rail transport still handles the greater part of manufactured goods. Railhead services have also been considerably improved. The effect of the type of container on costs of transport must not be overlooked. For export transport the services of either a forwarding agent or a shipping agent are usually employed.

Marketing Costs

The key to more efficient commodity distribution is a detailed study of distribution costs, whether manufacturer's, wholesaler's or retailer's. It is suggested that marketing technique must be scientifically analysed and marketing costs allocated to individual commodities.

Costs may be classified as follows—

1. The maintenance of stocks. Costs to be allocated include the interest on the value of stores, rent or cost of storage.

2. The movement of commodities involves the freight, the number of units moved and the cost of invoicing.

3. After-sales service to customers involves the cost of stocking spare parts at strategic points. After-sales service adds to reputation, but must not eat into gross profits.

The economics of stock holding involves a decision as to whether the manufacturer will finance and carry the risk, or sell outright at a lower price to the stockist.

The relative efficiency of the marketing organization may be indicated by comparing the selling costs and sales curves. If possible, it is useful to compare the selling cost per £ of sales turnover with that of other firms in the same class of trade, and with the industry as a whole.

The Business Administration Department of the London School of Economics, in conjunction with the Bank of England, obtains cost figures of London retail stores from which it calculates averages with which the various firms can compare their own costs without knowing the actual costs of their rivals.

Summary

Research in distribution is as essential as in any other phase of industrial activity, and the above considerations may be briefly summarized in the following steps—

1. Analyse the market with both a short and a long view.
2. Critically examine the product from the selling as well as the technical point of view.
3. Adapt advertising and sales-promotion efforts to meet the potential sales.
4. Determine the best distribution centres and channels.
5. Study competitors' marketing efforts.
6. Study packing methods.
7. Determine the most efficient method of transport.
8. Determine the cost of service to customers.
9. Make a detailed analysis of distribution costs; express them as a percentage of the sales £.

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CHAPTER XIII

OFFICE ADMINISTRATION

The efficient and economic organization of the office as an executive instrument so that waste is eliminated and information available as required is of the utmost importance to a firm, especially when it is remembered that the office is the principal means of contact with the public, and stands athwart production and the marketing function. The office used to house a collection of poorly-paid clerks filling up enormous ledgers in longhand and specializing in slow-motion. Little or no management was considered necessary It was an unfortunate necessity; a deadweight to be carried by the business. Machine production has changed the speed and scale of output. Transport facilities and communication have accelerated enormously. To-day the office is the control tower of modern business, where data are rapidly collected and analysed and light is thrown on costs, prices, profits, economies and inefficiencies. Exact knowledge of up-to-date facts and figures is provided for the management to make its decisions and frame its policy without the shock of surprise.

The accounts prepared by the office should present the facts in their proper perspective and show a true picture of the company's position. Moreover, they should indicate the trend of the business from which the budget for the future may be planned and prepared.

The office not only keeps the records of the day-to-day transactions of a firm but links up the production, sales and financial departments for administrative control. The functional heads of a business are usually qualified by the possession of professional or technical knowledge and sometimes overlook the importance of clerical work and technique. The control of office activities requires, however, an expert and specialized knowledge, and office work must

be no less efficiently organized and supervised than the work of production. It is equally subject to the laws of scientific management, and the establishment of right policies, methods and means of control needs the same thought and attention as that given in the shops. Properly organized office work will be highly productive and a great economizer of a firm's energies.

The principal developments in office management are connected with appreciation of the importance of the office in profit making, the extension of production technique to office routines, and the increasing use of machinery.

In the preparation of accounts the office has to give a true picture of the company's position and indicate the trend of the business. From these the directors plan the future policy and a budget is prepared predetermining every important phase of the company's operations.

The Office Manager

The responsibility of the office manager may be divided under the following headings:—

> The staff, its control and housing (the office building, its lay-out, condition and upkeep), the grouping and flow of work;
>
> The relationship between the office and the manufacturing side of the business;
>
> The most efficient performance of clerical processes, filing, typing, mailing, computing, etc.

His job is usually flexible and his importance depends almost entirely on his own efforts and abilities.

The office manager must have directive ability and a sense of responsibility. He must examine the work of the office and closely question the actual utility of every process. If any are not essential, he should eliminate them.

Policies and costs sometimes clash. The necessity of clearing work day by day may require a staff more than equal to the load on some days. The office manager's job therefore entails a nice balance of efficiency and cost.

Particularly in course of growth an office tends to become a source of waste and the manager should check his own efficiency as expressed by a financial ratio in terms of standard or accepted practice.

Wherever office routine is of a repetitive nature, the manager must place the load of repetition on a machine or gadget, and efficiency and output are increased by keeping abreast of the improvements in equipment.

Organization

Organization is necessary to office efficiency. After finding the right person with the requisite personal qualifications and executive viewpoint necessary to run the office, the first step is to have a definite knowledge of what is involved. This demands an analysis of the purpose of the office as well as ascertaining the actual facts relating to the work. The next step is to set down the correct orderly sequence of the work and to determine the right method of performing it. A system must be laid down which reduces office work to the simplest and therefore the cheapest forms, an adaptable and expandable system providing for the interlocking of all sections of the work, and independent of wide fluctuations in quantity.

An organization chart should be drawn up showing the methodical flow of work, which will, of course, be brought to the knowledge of all the employees.

The actual accomplishment of office work is best done by planning ahead to a schedule, which involves not only a knowledge of how the work is to be done, but also of the capacities of machines and workers. Planning office work permits the anticipation and removal of disturbing influences. It enables assignment of work to be made logically and systematically; there is a balanced load on the staff, and work flows freely without pressure and drive.

Planning includes operation analysis and standardization. The steps in office work should be tabulated and a time analysis made. Time and motion studies are as

useful in the office as in production, and the same rules apply; for example, adequate allowances must be made for fatigue and rest pauses. Wherever practicable, instruction cards should also be drawn up. Time studies put the establishment of schedules on a scientific basis.

Emphasis must be laid, however, on not losing sight at any time of the personal element. Neglect of psychological factors may neutralize the effect of good planning with regard to physical factors. Efficient planning and organization of the work assists in itself to establish a high morale of the staff, but continual attention must be given to making them contented with their environment, with opportunities for development and ambition.

The efficiency and happiness of clerical workers are affected as much by supervision and interdepartmental relations as by good physical environment in the office.

Office Staff

There are two main functions of office management—the method of handling office routine and the system of staff management or the control of personnel. It is generally conceded that a well-trained staff and a mediocre routine is better than an excellent routine and a badly-trained staff.

To get the right type of personnel in office work they must be carefully selected, given responsibilities which test their abilities, and promoted in accordance with their worth and efficiency. Too much care cannot be given to staff selection and training, because staff costs are usually the highest costs of any office routine. Desirable characteristics in office workers are accuracy, neatness, a sense of responsibility, and the ability to concentrate and work at high speed when necessary, and to analyse office procedure and reason for themselves. They must have a knowledge of the use of reference books, dictionaries, directories, atlases, and so on.

If employment tests are used to fit abilities and qualifications to salaries, they must be part of a well-thought-out plan, fitting into the personnel policy of the organization.

They are unreliable unless there is a sizable group of employees for study and some measure of success in the job available

In some of the larger firms a system of rating is adopted for each class of labour, based on an analysis of the qualities most desirable for the class under consideration. Wages are fixed in relation to this rating, which provides for a progressive improvement of the staff and opportunity for advancement by merit of the brilliant clerks.

The practice of studying repetition work and paying bonuses on output in clerical operations is on the increase, though accompanied by attention to physical and mental well-being of the staff. Office production study is directed to the quickest and least fatiguing methods, and the pleasanter the conditions the smoother the flow of work.

Subdivision of office duties and the simplification of each facilitate training Training should be on the job, and the manager should encourage the formation of good work habits.

Lay-out and Equipment

Attention to the physical lay-out and equipment of the office is essential for efficiency and control. First in importance in considering lay-out is the placing of departments in logical relation to one another to prevent unnecessary journeys of personnel and records and the internal planning of each department to permit documents to travel from desk to adjoining desk instead of backwards and forwards. The office should be well lighted and ventilated, adequately heated, and not cramped for space. Special attention should be given to floor covering and other means of noise elimination. All departments should be conveniently located and laid out in conformity with the flow of work. Intercommunication is important, involving the use of a messenger service with or without mechanical aids or completely mechanical devices for delivering papers and office supplies. For oral communication office telephones or dictographs are available.

With regard to office equipment and furniture, specialist books or trade literature should be consulted and efficiency exhibitions should be attended to keep pace with the developments in mechanical devices. Some degree of standardization has been achieved in desks, chairs, filing cabinets, indexing appliances, and so on, and this in general improves the appearance of the office. The economy of steel construction is generally recognized.

There are three main sections of office appliances—accounting appliances, furniture and stationery, and machines for the various phases of correspondence work. It is not necessary for an office manager to know the mechanical details of office machinery, but he must know what is available and when each type can be economically employed.

Mechanization

Office mechanization may be divided into machines for the preparation of documents and those for handling documents.

(1) Machines for recording data such as typewriters, tabulators, addressographs, dictaphones, telediphones for automatic verbatim recording, cash-registers, book-keeping machines, punching, sorting and tabulating machines, cheque-writers, machines for printing tickets.

(2) Duplicating machines.

(3) Machines for analysing data—book-keeping machines.

(4) Machines for performing calculations, coin counters, calculating machines

(5) Machines for transmitting messages: (*a*) verbal-dictographs; (*b*) documents—pneumatic tubes.

(6) Machines for opening and franking the mail, dating machines, clocking machines.

The efficiency of the modern office is largely due to the mechanical devices employed, but in using machines it is necessary to study the type of mentality to be applied to them.

Machinery should as a rule be used wherever it will save labour. The decision whether to mechanize or not involves the well-known economic problem of first cost and upkeep *versus* the running expenses saved. When a task can be reduced to routine, mechanization will be advantageous and appliances will be found to do more accurately and rapidly the processes previously done by clerks.

Just as the justification of office expenditure lies in its ability to help the firm to make profits, so the justification for purchasing office machinery must lie in demonstrable increase of effectiveness of the office staff. The criterion of mechanical accounting is how much money will it save. When new machines come out there is a strong temptation to purchase them, but a manager must first carefully investigate whether some other system using available machines will prove more economical.

Ordinary office routines include: correspondence and filing, office stationery and printing, sales accounts and collection, purchase accounts, invoice completion, cash and bank accounts, mail opening, entry index, and order routine.

Routine should be laid down from the opening of the post to cover the movement of each document to the outgoing post. Work is planned to move in a straight line and is left each time it is handled ready for the next operation.

All office routine involves records of one kind or another, and these records must be reduced to a minimum. Numbers, initials, abbreviations, and codes are used to speed recording. Numbers, symbols, and so on to represent information must be carefully planned, as well as the forms used for recording. The trend is to make one recording of information sufficient for all purposes.

FORMS

Methods of obtaining multiple copies are: carbon copies (either handwritten or typed), booking and billing machines, punched card systems, the teleprinter, duplicating machines and addressing machines, printing machines, perforated

paper roll machines and photographic reproducers In introducing a multiple copy system, the office manager must decide how many copies are required, whether each should contain exactly the same matter, whether uniformity of size and colour is desired, and what accuracy of registration is required.

Careful attention should be given to the forms used by the firm. They should be well designed, convenient to handle, with a shading or colour scheme to identify or indicate the department concerned. Forms in an office correspond to jigs in a production shop, and are great time-savers.

Forms are apt to increase out of all proportion to economy and a survey should be made to see that none are remaining in use after their utility has passed. If all forms are made to take the size of a part or multiple of a standard sheet, the number and size of envelopes required may be reduced. The possibility of combining forms and other means of saving paper should be investigated. The standardization of business documents has been suggested but it will be a long time before the problem is solved

Control of office supplies is an important item. Special attention should be given to their storage and issue, cost, ordering quantities and consumption control to minimize wastage. The forms may be printed in the office itself.

FILING

Files may be arranged alphabetically, geographically or by subjects. Care must be given to lending and safeguarding records, which is assisted by efficient indexing and coding. The transfer and final disposition of records must also receive attention. No system by itself solves all filing problems. Each office has to adapt a system to its own requirements.

The filing system should fit the work as then it becomes an effective tool in systematic office practice. The filing index should be simple and clear, and the system independent

of the absence of any particular individual. To prevent waste of time and vexatious delays a foolproof system of locating every communication must be adopted. Much trouble arises from the retaining of files or losing sight of papers on the way to the files This can be minimized by collecting and filing all papers not actually in use every half-hour or so, so that one ensures that no communication is "floating" longer than that period. Tickler systems can be used in connection with filing as well as for many other office purposes Whilst the principles of filing have remained much the same, definite advances have occurred in filing equipment.

For record-keeping purposes the loose-leaf system has been found to possess many advantages.

Mail opening and distribution must receive systematic attention owing to its importance in starting the day's work.

Owing to the important effect of style and form in correspondence, great care must be taken to train typists and instruct them that the written word carries the reputation of the firm. One of the advantages of the centralization of typists is that it ensures uniformity of style and form of letters. Another is that the work can be better planned and supervised and a minimum staff carried. Whilst centralization often shows economies it can, however, like other good things, be overdone.

FURTHER READING

(a) *Office Administration for Manufacturers:* R A. Mills. (Pitman.)
Economy and Control Through Office Method. E. W. Workman. (Pitman.)
Office Practice: W. Campbell. (Pitman)
The Office Supervisor · Nilles (John Wiley & Sons.)
(b) *Industrial Psychology Applied to the Office:* Raphael, Frisby and Hunt. (Pitman.)
Modern Office Appliances: V. E Jackson (Macdonald & Evans.)
Textbook of Office Management. W. H Leppingwell. (McGraw-Hill)

CHAPTER XIV

THE MANAGEMENT FUNCTION—PSYCHOLOGICAL FACTORS

To engineering students there is no need to stress the interest of scientific technique. It is the nourishing principle at the root of human achievement; on it rests the entire structure of material progress. We are in fact living in an age of mechanism, the result of human efforts being mainly expended since the Industrial Revolution in providing our works with increasingly efficient mechanical equipment.

The major issues of the mechanistic side of production are, however, now virtually settled, and we are entering the age of administration, where the dominant problem is one of discovering those methods of organization and management by which the vast productive agencies can best be controlled. Successful industrial management depends more and more upon management of men rather than upon the organization of machines and other practical engineering problems.

In courses on production engineering, the student is mainly concerned with the machinery of production and with the planning, building, equipment and arrangement of engineering shops. A works manager is concerned with running them efficiently when manned by ordinary human operatives. Thus a manager must have, in addition to a quality sense, a money sense (or an economic mentality based on experience) and a time sense, an extra sense, viz. the ability to control and manage men. Let us examine the first three senses. A quality sense involves appreciation of efficiency of design, quality of materials, accuracy of workmanship. A money sense involves incessantly striving to reduce manufacturing cost by simplification and standardization, scheduling, budgetary control, planning

production flow, and other aids to efficiency. A time sense involves progress work so that delivery times are minimized, and the customer not only receives a good quality article at the right price, but at the right time

Now when engineers have to deal with a technical problem they begin by ridding it of the human element, but in managing an engineering works there is a whole mass of human, social, and economic reactions, which not only must not be ignored but often override the engineering details.

Engineering is concerned primarily with the application, direction and control of mechanical forces, but in management one has to study the control of human forces.

Alongside the development of machines, plant and methods of production, it is equally essential to improve human relationships and personnel procedures. Even where this has been appreciated, attention has in the past been devoted too exclusively to the external forms of organization and insufficiently to the human element on which real efficiency must finally depend.

Properly conceived, industry is directed to the satisfaction of human wants and increasing the amenities of life. To this end management seeks to apply the co-ordinated knowledge of physical science, psychology, and experience.

An engineer whose training has been purely vocational may find, when entering a managerial position, that his interest in science obscures his interest in persons. He is a specialist, and it has frequently been suggested that specialist thinking impairs the powers of general thinking. A self-made man remarked, "If you have not got an education you just have to use your brains," and there is a great deal in this comment. Information is not knowledge, and knowledge is not wisdom. In knowledge men stand on the shoulders of their predecessors; in moral nature and character they stand on the same ground. Character does not mature in cloisters, and exposure is necessary to prove

immunity. Daily contact with humanity is essential in order to understand human psychology and human needs. Industrial activities now depend so much on the action of others that a wide knowledge of life and the economic principles which govern the affairs and actions is essential for managerial success.

The Importance of Managerial Ability

It is a matter of general experience that given the same group of workers with the same equipment and the same pay, under one manager the workers will give of their best in energy and intelligence; under another they will give as little as they can. The one understands how to organize human beings and the other does not; the one has their confidence and goodwill and the other has not.

The problem of controlling men is admittedly more difficult than that of running machines, and those responsible for the administration of firms are increasingly realizing the great importance of surrounding themselves with a body of officers possessing not only the necessary technical qualifications but the power of leading men.

What is Management?

In recent times industrial ownership has become quite impersonal and has no direct human contacts with the undertaking. Direction and control have been delegated to the managerial function, the last-born child of the Industrial Revolution.

Management not only leads a business enterprise, it is the intermediary, the vital link, between the bodies for whom production is being carried on and the workers engaged in the particular business It faces both ways, with duties and responsibilities to each. Under private enterprise it joins together capital and labour for production in the interests of ownership, under public enterprise it has the task of linking up the interests of the whole mass of consumers with those of the labour employed.

The problems of management become increasingly complex and it is essential to give more consideration to efficient methods of control. For an organization to run smoothly, true leadership is required, the creative power which achieves concrete results. Efficient factory output is due to leadership, not to a bevy of experts. Organization is only a tool to be wielded by a leader possessing aptitude, personality and imagination, who inspires the personnel to work together as a whole Management is the force which leads, guides and directs the organization to the fulfilment of a predetermined task—hence personnel is its chief concern. An employment policy must be adopted which is based on a wise and generous understanding of human nature. A manager must treat all his men with attention and respect as financial incentives are not the only incentives of low production costs. Intelligent personnel work is also a controlling factor. The ultimate success of an undertaking depends fundamentally on the goodwill and willing co-operation of the individuals making up the organization.

Good management establishes an efficient organization with definite and clear-cut responsibilities coupled with corresponding authority. It has to knit together the energies, mechanical, physical and mental, of the establishment, and serve as a rallying point for loyalty.

Management is a way of thinking: the majority of the facts of management are connected with human beings, who differ in mentality and temperament. It has the task of inducing men to co-operate, and much of its success consists in the avoidance of strife and friction.

The efficiency of a manager lies on a different plane from that of his subordinates. The requirements of a subordinate are faithful performance of duty with limited responsibility. In a subordinate position a man may know only one thing, and he may be a valuable man, but he is subordinate and generally remains so.

The requisites of a manager are the assumption of responsibility, the taking of decisions and the getting of results.

He must have a general efficiency, a fresh and elastic mind, a true perspective and the ability to generalize facts and figures, and ascertain general trends. He has to do as little as possible as regards details, and as much as possible as regards policies or, as it has been expressed, nothing to do but everything to decide.[1] To this end he delegates duties by a shrewd sizing up of men, putting each in a position for which he is fitted, and inspiringly calling forth effort of hand, mind, and heart from those managed. Probably 85 per cent of management lies in direction and 15 per cent in execution.

SPECIFICATIONS FOR A MANAGER

The following interesting and instructive "specifications" for managers have been drawn up by two leaders of industry in this country. It will be noted that scientific and technical knowledge is one, and only one, of the requisites of a successful manager.

[1] "What is an Executive?"—Extract from an address by Mr G. Cheliotti.

"Executives are a fortunate lot, for as everyone knows, an executive has nothing to do, that is except:

"To decide what is to be done, to tell somebody to do it; to listen to reasons why it should not be done, why it should be done by somebody else, or why it should be done in a different way, and to prepare arguments in rebuttal that shall be convincing and conclusive.

"To follow up to see if the thing has been done; to discover that it has not been done, to inquire why it has not been done, to listen to excuses from the person who did not do it; and to think up arguments to overcome the excuses.

"To follow up a second time to see if the thing has been done; to discover that it has been done incorrectly; to point out how it shall be done, to conclude that as long as it has been done it might as well be left as it is; to wonder if it were not the time to get rid of the person who cannot do a thing correctly; to reflect that in all probability any successor would be just as bad or worse.

"To consider how much more simply and better the thing would have been done had he done it himself in the first place; to reflect satisfactorily that if he had done it himself he would have been able to do it right in twenty minutes and that as things turned out, he, himself, spent two days trying to find out why it is that it had taken somebody else three weeks to do it wrong and to realize such an idea would have a very demoralizing effect on the organization, because it would strike at the very fountain of the belief of all employees that an executive has nothing to do."

Points in Personnel Rating for Promotion to Managerial Rank

1. Knowledge of job.
2. Intelligence.
3. Quality of work.
4. Quantity of work.
5. How he conducts himself with others.
6. Initiative.
7. Keenness and loyalty.
8. Ability to make decisions and take responsibility.
9. Ability to pass on information.
10. Organizing ability.

Qualities Demanded of a Manager

(*a*) Power of leadership—ability to foster teamwork
(*b*) Creative imagination.
(*c*) Intellectual sincerity and moral courage.
(*d*) Power to co-operate with others.
(*e*) Knowledge of administrative principles.
(*f*) Capacity for delegating authority.
(*g*) Scientific and technical knowledge.

Subdivision of (*a*): Power of leadership—

1. Reliability.
2. Knowledge of the personal characteristics of his associates.
3. Willingness to receive suggestions.
4. Ability to criticize without antagonizing
5. Ability to make just decisions at all times.
6. Possession of a just and honest character.

This idea may, of course, be carried too far, as will be indicated by some American specifications, which contain an awe-inspiring and impossible list of qualities demanded in an executive, but the gist of the matter is that an engineering training, however sound and however essential, is by itself far from being a sufficient preparation for those destined to occupy positions of managerial responsibility. A narrow technical training in the quantitative sciences does not fit a man to assume the leadership of men: in fact he may be dehumanized by the very intensity of his routine studies.

A manager is concerned with the non-technical problems of industry. In addition to technical leadership, he has to

see that psychological, legal, and social considerations are given true worth.

On the psychological side he must have a knowledge of human nature and the conduct of men, so as to gain their esteem and collaboration, welding them into a willing and effective team working in the interests of the firm.

To be a successful manager a man must have temperamental fitness as well as technical ability It is difficult if not impossible to give a definition of personality but even if an acceptable one could be propounded it would be of little practical value. Like electricity, however, we may not know what personality is but we know what it does. We recognize it as an important element in making friends, in inspiring confidence, in getting control of situations, in running and holding jobs. Personality is not developed by confining its operations to technical and specialized things. A man may have technical skill but may alienate others: train an apprentice and then lose him.

There is no clearly marked boundary dividing personnel from production. Every technical act has a human effect Labour problems are inextricably interwoven with daily routine and other production problems. Technical problems may loom large to the engineer, financial problems are greater, but the problem of human organization and relations is most important of all.

Industrial leadership is coming increasingly into the hands of engineer managers, and they must see to it that true leadership replaces the past blind, mechanical, and sullen discipline by coercion.

Management Implies Leadership

The significance of the quality of leadership in industrial organization has frequently been neglected, but Henry Ford has said: "Prosperity and employment is the result of the skill with which business is managed. When leadership falters, business slackens, and the business begins to run the management"

Leadership is a somewhat intangible quality which the Services take the greatest pains to cultivate. It cannot be learned in classes or by the study of books It entails contact between man and man, and a special study of those who have to be led Suitable sports train men of all ranks for leadership. In committee work leadership qualities come out.

Leadership may be of three types—

1. Institutional, or of position, where no initiative is required but a respect for tradition.

2. Dominant, or of personality, usually possessed by the thick-skinned, emotional type, who loves responsibility, is capable of swift decisions, but who cannot bargain.

3. Persuasive, or functional, possessed by the administrative type, who puts ideas into language and appeals to the reason, possesses initiative, but may be something of an opportunist.

In industry, leadership is usually of the third type.

Leadership is the driving force which gets things done by others. No amount of organization can replace leadership: organization is merely supplementary.

The qualities of leaders at various levels are not identical. The highest type of leadership is found in those who can formulate a programme and see it through to completion. It involves clear thinking and skilful planning, but other factors than intellectual ones are necessary. Job mastery and good business judgment are not alone sufficient. The leader must be emotionally stable and possess evenness of manner: he must be able to distinguish opinions from facts and co-ordinate different points of view. Environment and training may help to develop leadership, but it depends fundamentally on native talents.

Leadership is concerned with securing tangible results by engendering willingness to work and co-operation on the part of others in the attainment of a planned objective. It involves getting people to work when their inclination is against it

A manager's duty is to engender a group power, bringing about team work and the proper adjustment of the individual to his job. Every member of the team must be made to feel that he has made a real contribution to the visible results.

The characteristics on which leadership depends, in addition to the competence which arises from technical qualifications, include—

Reliability or dependability.
Energy, vitality, courage and initiative.
Confident acceptance of responsibility
Humour, not taking oneself too seriously.
Tact, understanding: ability to see another's point of view.
Imagination, ability to project oneself into another's place.
A sense of justice.
Good judgment and discrimination.
Capability to plan and recognize opportunity
Ability to organize.
Ability to co-ordinate and adjust, e.g. the rival claims of different people.
Ability to concentrate, thoroughness
Liking for the work.
Liking for the men.

A leader believes in men and thus gets them to believe in themselves. He must have an appreciation of the personality of his subordinates, inducing them to work with the minimum of friction and anxiety, moulding men in their convictions, not subduing them in their actions.

It is characteristic of a leader to feel an innate pleasure in the work he controls and in the assumption of responsibility for it. He must feel himself an organic and not a mechanical part of the undertaking, remembering that his personality determines the mentality and morale of the whole.

It should be remembered that the employee only reflects what comes from above, and is entitled to receive the right kind of direction and supervision. Labour undoubtedly welcomes trained leadership, responds and co-operates with it. It must, however, be remembered that the most

that skilled management can do is to maintain harmonious relations with labour subject to the exigencies of the profit and loss account. When economic forces over which the individual management has no control, depressions, for instance, affect profitability and lead to a clash of interest between wage-earners and shareholders, then the manager can only remember that he is a servant of the owners

Public Administration

Public administration, which is of the first type of "leadership," is characterized by red tape, procrastination, signing and counter-signing, reference back to committee, and a cynical disregard for the rights of the customer. There is a rule in commercial undertakings that the customer is always right. In public administration, on the other hand, not only is the customer wrong but the fact that he has any rights is a deliberate or pernicious conspiracy against the public official.

The latter claims that the man with a grievance is not the average man, but there is no such thing as the average man. The industrialist, on the other hand, would seriously consider the complaint, see the man, lead him to think that the factory is run for his benefit, and turn him into a friend and walking advertisement. To the public administrator the man is just a nuisance, ignored and left to become morbid with discontent.

The industrial administrator does not give his attention to matters, however large, which are going according to plan, but to exceptions, disturbances and unusual features so as to constrain them back to the plan. Public administrators do not administer—they either thrust or are pushed. They worship tradition, compromise and passivity. Nor is this accidental, for the negativeness of public administration is designed to further the economic interests of those industrial groups which are large enough to look after themselves and thus assists monopoly. The obstructionist public administrator would not be tolerated if he served no purpose

or interests at all, for he would lack all support. The quality of public administration therefore depends entirely upon its purpose, and where there is no conflict of interests then public administrators are obliged and are able to conform to the high standards demanded of industrial administrators.

Problems of Authority

The problems of authority in industry are immense and only partially solved. Commanding, deciding, and guiding constitute a difficult task and involve a difficult technique, in fact they presuppose an innate talent. Intelligence and practical ability have little or nothing to do with it. Honourable behaviour, for example, seems an innate attribute and is independent of home influence or educational environment. Native talent plus a liberal mind is required in a leader, but training will enable him to lead boldly and therefore more effectively.

Old methods of leadership survive. A man may adopt a device here, a method there, and an idea from somewhere else, and think that by patchwork he can achieve all that is required, but the true executive is receptive and adaptable, progressive, balanced, self-controlled and possessing judgment and understanding in human affairs. To keep abreast of progress he absorbs and assimilates the best proved principles on which to base all his methods and work. Unfortunately there is no index to leadership ability, but there is an acid test. All management problems are in the end subject to economic efficiency, the running of a business at costs not greater than those of competitive concerns. A manager must therefore have an understanding of the conditions of success. It is claimed here that the most vital factor is a thorough knowledge of types and temperaments, human relationships, and ways of handling men.

Another requisite of a manager is a natural desire to co-operate. Without sympathetic understanding of the jobs and the men, responsibilities will not be equitably distributed. A test of a good executive is the power to delegate.

In every managerial decision there are three stages, viz fact finding, deliberation on the facts, and deciding from the facts. Each of these steps will be delegated, as the manager goes higher up the ladder of control.

To be successful, management must be capable of propagating or perpetuating itself by surrounding itself with the correct type of staff to carry on its purposes and ideals. The chief problem of dictatorship is the succession, and the same problem occurs in management. For this reason increasing attention is being given to training for management, which will be less wasteful than the old trial and error methods of selection. The principle of separate recruitment and training of managers may eventually be adopted, though it must be admitted that tests of character or temperament are still in their infancy. One thing is certain however: there is no best way to administrative competency; it varies from individual to individual. Some young men show an inclination to leadership at an early age, but the detection and appraisal of special aptitudes and the ascertainment of individual capacity is usually a difficult matter, best carried out from observation and study in a wide range of tasks.

FURTHER READING

(a) *Industrial Psychology:* Myers. (Butterworth.)
Modern Foremanship: Burnham. (Pitman.)
(b) *Industrial Psychology:* Viteles. (Jonathan Cape.)

CHAPTER XV

TAXATION

The purposes of taxation are to raise funds for public purposes, to prohibit or regulate certain activities, and to equalize the distribution of wealth.

Taxes are raised either by the national or by the local authorities for expenditure of general benefit, such as on the roads, or of more particular benefit where no specific charge is practicable or desirable on the beneficiaries, such as education, or where reliefs are granted, such as poor relief or industrial subsidies. The earliest forms of taxation in this country were in fact levies for the king's army and for the roads and poor relief. Broadly, then, taxes are compulsory contributions from persons for the rendering of services for which no specific charge can be made.

Taxes designed to produce income are called revenue taxes, but if their main purpose is to regulate or to prohibit, for instance protective taxes on competitive imports, then they should not be very productive.

Taxation may also aim at equalizing incomes by reducing the higher incomes in order to provide social services for those with low incomes.

Taxed income is not lost, it does not constitute an impoverishment of the nation as the spokesmen of highly taxed incomes would have it believed; instead it represents income applied to *public* as opposed to *private* purposes. The criterion for all revenue taxation is the social gain: does the nation as a whole benefit or not by the transfer of the income to public purposes?

National Taxation

The following table shows the main sources of Government revenue and the main heads of expenditure. It also

shows the increase in public expenditure over the past ten years, by no means entirely due to rearmament.

NATIONAL BUDGET

	1929–30	1938–9
REVENUE £ mn.		
Inland Revenue. Income Tax	237·4	335 9
Surtax	56·6	62·5
Estate, etc, Duties	79·8	77·4
Stamps	25·7	21·0
Other Inland Revenue	3 2	1·6
National Defence Contribution	—	21·9
	402·7	520·3
Customs	119·9	226·3
Excise	127·5	114·2
	247·4	340·5
Motor Vehicles Duties	26·8	35·6
Post Office Net Receipt	9·0	10·9
Miscellaneous	70·3	19·9
Total Ordinary Revenue	756·2	927·2
Add Special borrowing for defence		128·0
		1,055 2
EXPENDITURE £ mn		
National Debt Interest and Service	355·0	230·0
Other Consolidated Fund	22·2	14·3
	377·2	244 3
Defence	113·0	400·4[1]
Civil Expenditure	280·4	423·3
Total Expenditure	770 6	1068·0

[1] Including £18 mn. A R.P. and Food Storage.

The increase in State expenditure over the past eighty years relative to the total national income is further illustrated by the following table. The national income, which is the income of the whole population, and represents the value of the national output, must not be confused with the income of the State, which is that part of the national income taken in taxation for public purposes.

NATIONAL INCOME AND GOVERNMENT EXPENDITURE[1]

National Income		Government Expenditure							
Period[2]		Total[3]		National Debt Service		Defence		Other	
	£ mn	£ mn.	Per cent	£ mn	Per cent	£ mn	Per cent	£ mn	Per cent
1860–9 average	899	66	7 3	26	2 9	27	3 0	13	1 4
1911–13 average	2,241	165	7·4	24	1 1	73	3 3	68	3 0
1929	4,384	771	17 6	355	8 1	113	2 6	303	6 9
1937	5,200	908	17 4	227	4 4	262	5 0	419	8 0
1938	5,000	1,068	21 4	230	4 6	400	8 0	438	8 7

[1] *Economist* Budget Supplement, 15th April, 1939.
[2] Calendar years for National Income
[3] Year ending 31st March of following calendar year for Expenditure Excluding Post Office, which is self-balancing

Social Services

Civil expenditure is largely for social services. These are financed partly by the central Government out of the proceeds of national taxation either in the form of allocations to specific purposes or of block grants to local authorities for the latter to allocate at their discretion. Further sums are raised by the local authorities through rates—on

SOCIAL SERVICES 1936–7

Expenditure	£ mn	Receipts		
		Parliamentary Votes	Rates and Block Grants	Other Sources e g Contributions
Unemployment:				
Insurance	44·4	21·6		43·5
Allowances	41·9	41·9		
Health Insurance	39·8	7·5		36·0
Pensions Old Age	44·8	44·8		
Widows	45·4	15·0		15·9
Education	115·2	54·2	51 9	9·1
Housing	43·8	16·3	4·2	23·3
Poor Relief	51·5	5·4	42·5	3 6
Health	27·8	0·7	24·1	3·2
	454·6	207 4	122 7	134·6
War Pensions	39·5	39·5		
	494·1	246 9		

the principle that matters of purely local concern should be financed locally—and finally the potential beneficiaries usually contribute a considerable proportion. The table on p. 288 shows the sources of income for the various services together with the amounts expended Where annual expenditure is variable, as for unemployment benefits, funds are accumulated in years of low expenditure to be drawn upon at other times.

Taxes: Direct and Indirect

Taxes may be direct or indirect. Direct taxation is imposed immediately on persons whom it is desired and intended should pay: for example, income tax. The impact of the tax, that is, the income at which it strikes, is here the same as its incidence, the income which ultimately bears the tax.

Indirect taxation is levied on certain commodities, and it is anticipated that the person taxed will indemnify himself at the expense of another, the ultimate consumer. It has the advantages that it is difficult of evasion, and the burden is not felt directly. Moreover, payment may be made at convenient times, and a means of taxing small incomes is provided. Indirect taxation tends to cause a dislocation and diversion of trade from the course it would otherwise pursue, in practice, however, the disturbance is diminished by applying taxes only to commodities for which the demand is largely inelastic.

Indirect taxes used to consist mainly of excise duties, but since the change in this country's fiscal policy in 1932, customs duties, which are older than internal duties, have contributed more largely to revenue. If duties are really protective they cannot, of course, produce revenue, but may be justified in assisting rising industries or keeping out dumped goods. Customs duties fall on consumers: it is difficult, if not impossible, to shift them on to the exporters.

Indirect taxation is the principal form of taxation on low incomes and is levied mainly on articles of wide consumption

to ensure wide contribution. At the same time this form of taxation is the least equitable since it falls most heavily, in a relative sense, on the lowest incomes and has no relation to capacity of the taxpayer to bear the burden.

The following tables show the main sources of indirect revenue and compare the relative importance of direct and indirect taxation in the British fiscal system.

CUSTOMS AND EXCISE

Sources of Revenue	Average Annual Revenue April, 1935–March, 1938
	£ mn.
Spirits, Beer and Wine	103·6
Tea, Cocoa, Sugar	19·3
Tobacco, Matches and Lighters	82·7
Hydrocarbon Oils	47·7
Entertainment	7·8
Liquor Licences and other	7·6
Total Revenue Duties	268·7
Protective Duties[1]	51 0
Total Customs and Excise	319·7
Add Motor Vehicle Duties	34·3
	354·0

Ratio of above items to total average tax revenue for period (£788 mn.) = 45 per cent.

[1] Including Duties under Import Duties Act, 1932 (over 50 per cent); Ottawa Duties (1933), McKenna Duties (1915); silk duties, etc.

SOURCES OF TAXATION

	Direct		Indirect[1]	
	£ mn.	Percentage	£ mn.	Percentage
1913–14	78	47 8	85	52 2
1929–30	377	55 6	300	44·4
1936–7	400	51·1	383	48 9
1937–8	447	53·2	394	46 8
1938–9	499	55·6	397	44·4

[1] Customs and Excise, Motor Vehicles, Stamps.

Principles of Taxation

The precise allocation of the burden of taxation necessarily depends on the interests which dominate a government. Whether taxation should be borne mainly by the higher incomes, who are not thereby deprived of necessities, or whether it should be shared by all classes even if this means that the lower income groups have to forgo necessities, is not a question to be decided academically but practically according to the political and social views of the government responsible. The following principles, subject to interpretation are, however, generally accepted, that taxation should be equal, certain, timely and economical to collect (the "four canons" of Adam Smith laid down in his *Wealth of Nations*). We may consider them in the reverse order. The principle of economy in tax collection is generally conceded, for the State will benefit little if the tax is expensive to collect. It has been estimated that the revenue of Great Britain costs about 4 per cent to collect, and stands international comparison very favourably. Obviously, taxation should retard production and consumption as little as possible, and as a rule should not be imposed on commodities with an elastic demand. A tax may obstruct industry and cause unemployment, in which case it can hardly be considered economical. Productiveness, however, covers a multitude of sins, successful administration of the State being the main object.

The principle of timeliness or convenience is to the effect that taxes should be so selected and arranged in time and manner of collection as to disturb as little as possible both producer and consumer. For the payment of customs and excise duties bonded warehouses were established to secure the minimum inconvenience. The principle involves taxing goods as shortly as possible before they are consumed, e.g. commodities at the time of their purchase, and taxing contracts and legacies at the time of their execution. Levying a tax at the source of income is also advocated on the grounds of convenience.

The principle of clearness or certainty intimates that the form, quantity, and manner of payment of the fax should be clear and plain to the contributor. In other words, there must be no confusion as to what, why, and when he must pay. Clearness is also important from the point of view of knowing exactly how much the imposition of a tax may be expected to raise. The Budget system is conducive to clearness owing to the discussion and publicity given to every detail.

The principle of equality of taxation is subject to various interpretations. Do we mean equality in amount, percentage, or in sacrifice? The ideal to aim at is, of course, that each contributor is left in the same relative position as before; in other words, that there should be proportional real sacrifice among taxpayers. This principle is sometimes referred to as the faculty theory, which is to the effect that a person should pay taxes in proportion to his power to do so. An attempt at equality of sacrifice is made by the introduction of progressive taxation, though it is on somewhat arbitrary lines, and it must be remembered that in estimating the progressiveness of taxation we should consider the system as a whole rather than a specific tax. We have also seen that proportional sacrifices of money income are not equivalent to sacrifices of the utility of income. As a person's clear net income increases, therefore, the rate of taxation should also be increased. Consumption made possible by small incomes is the more important socially.

Tendencies in Taxation

A desirable feature in taxation is elasticity; that is to say, it is extremely useful from the Government point of view to devise taxes, the yield of which may be increased or diminished within limits by simply raising or lowering the rates. An example is the income tax, which, originally imposed to help finance the Napoleonic wars, was

resuscitated because of the exhaustion of the elasticity of taxes on commodities.

Modern tendencies in taxation embody ideas of social reform and tend to accept the principle of taxation in proportion to ability to pay. Not only is increased revenue raised by graduated income tax and surtax and the taxation of unearned income (since 1907 unearned income has borne slightly more tax than earned income though the difference is only felt in the low income grades), but it is considered right to grant relief for family obligations and, to industry, on the ground of depression, and transfer the burden to consumers of luxury commodities.

Progressive taxation may be applied in various ways, but its productiveness must not be over-estimated. There is a danger of penalizing savings and arresting the expansion of industry. Here again the social gain must be the criterion of policy. If the purpose for which the taxation is required is more important than additions to capital assets then the taxation is justified. Similarly, while heavy taxation might discourage production in time of peace, in time of war it may be a desirable method of transferring production from peace to war industries.

Unearned increment may be defined as the increase in the value of things due to improvement of social conditions and progress. It is considered equitable that rates and taxes should be so devised that property increased in value by social improvements should bear part of the expense of these improvements. This is attained by periodic revision of assessable values.

Incidence of Taxation

Incidence refers to where the burden of a tax finally falls. The effect of a tax in reducing consumption will depend upon the extent to which the tax is passed on to the consumer, which in turn will depend partly on the elasticity of demand and partly on the conditions of supply, whether the commodity is produced under increasing, constant, or

decreasing returns. The tax is more easily passed on by a monopoly than by competitive producers, though in practice producers, however competitive, usually unite on such a question of policy.

Taxes on property are probably the oldest. They involve, however, the disadvantage of the declaration or valuation of property. A tax on property in the form of shares lies where it falls; in the case of real property it is probably passed on. Taxation of land falls on the owner, of house property on the tenant, of business on the consumer of the commodities or utilities produced therein.

As previously mentioned, customs duties are much older than internal duties. Import duties are usually shifted on to the consumer, as they are intended to be, and it will be seen that their general effect will be to reduce imports, and therefore, under certain circumstances, exports. Home industries will, however, be encouraged. Prices have to cover the home producers' costs, so that in general the duties will be paid in whole or in part by the country imposing them. The broad effect is to lessen the relative advantages of international trade.

As a rule, interference with profits receives no support from industry, but under the special conditions created by the war of 1914 a Corporation Profits Tax was introduced, which was assessable on the profits of limited companies with certain exceptions. The tax was repealed on the return to normal conditions, but in 1938–9, as a result first of rearmament and then of the war, new direct taxes on excess profits were again introduced.

From the Report of the Committee on National Debt and Taxation (issued in 1927), it appears that the incidence of the post-war increases of indirect taxation remained mainly on the wage-earning consumers. An analysis of the sources of tax revenue and the purposes to which it is applied shows the extent to which wage-earning consumers themselves pay for the benefits which they derive from State expenditure. In 1935–6 the working class contributed

one-third of total national and local taxation (£338 millions against £685 millions contributed by the well-to-do), while of the total expenditure £429 millions was beneficial to the working-class, £263 millions was beneficial to the well-to-do (National Debt interest and highways), and £331 millions (including the cost of armaments as well as of general administration) was not specifically allocated to one class or to the other, though it was borne by the well-to-do.[1]

Income Tax

The income tax in this country was first established from 1798 to 1816 as a war measure and reimposed in 1842. An important feature is the extensive use of taxation at the source, e.g. by deduction from dividends and other sums payable by companies or other business undertakings before they are passed on to shareholders or recipients. At the beginning of last century, five schedules relating to income tax were introduced, which, with substantial modifications are still in force. Schedule A refers to income from ownership of land, houses, and other property, statutory deductions being made for repairs, maintenance, and insurance; Schedule B relates to income in respect of land occupied; Schedule C to dividends from the public revenue (e.g. Government stocks); Schedule D covers profits from trade and manufacture, income from professions and vocations, interest paid in full and profits of an uncertain value, income from Dominion and foreign investments and possessions, and miscellaneous profits. Income tax under Schedule E is charged on income derived from all employments, whether under the Government, public bodies, companies, societies, firms, or individuals. Income tax is an annual tax incorporated in the Finance Act passed each year by Parliament.

Broadly speaking, income tax cannot be shifted by the person on whom it is laid, and is therefore a burden on the industry on the profits of which it is levied. Taxes on

[1] *National Income and Outlay*: Colin Clark.

company profits, however, can be passed on to consumers by a whole industry.

Burdensome Taxation

Excessive taxation is said to discourage earning above a certain amount, diminish the saving of capital, impede industry and progress, and increase unemployment.

Whilst taxation makes a drain on the savings that supply fresh capital for industry, the Committee on National Debt and Taxation came to the conclusion that a serious view was not altogether in accordance with the facts.

It should be remembered that sums raised in taxation do not disappear, but are spent by the State and return as income to State employees. The question of taxation is not therefore one of private spending or investment versus taxation, but of private spending versus public spending. When business men talk of the depressing effects of taxation they are looking at the question from a personal viewpoint only, yet nevertheless high taxes may arouse such antagonism that a strike of "capital" may result, i.e. business men may withhold investment and hoard, and by interrupting the circulation of incomes engineer a trade depression to embarrass the government responsible for the taxation. Both France and the United States have provided illustrations of this.

The Colwyn Committee (1927) investigated the question of the comparative burden of taxation in different countries, and concluded that the factor had affected British industry, but only in a minor way compared with more general difficulties. They agreed, however, that the taxation per head of population was much greater in this country than in any on the Continent, or in the United States.

According to data collected by the Board of Inland Revenue, the high rate of income tax following the 1914–18 war has not involved a diminution in the provision of reserves of public companies. The undistributed profits of a public company are not for the most part liable to surtax.

Death duties, taxes on capital used for general expenditure, are not destructive of capital as is sometimes suggested. No real wealth is destroyed when estates are taxed, though part of the original estate will be sold to pay the duties. Transfer of wealth and not the destruction of wealth is all that occurs, while moreover if the State did not obtain its revenue from death duties it would have to obtain it by taxes on incomes. All taxes interfere with either private spending or saving and it makes no difference what the basis of the tax is, whether income or capital; in all cases spending power is transferred from individuals to the State.

State Assistance to Industry

In recent years the principle has been adopted of applying the proceeds of national taxation to assist a depressed or struggling industry. The following table indicates the sums voted by Parliament for the purpose.

STATE ASSISTANCE TO INDUSTRY

	Average Annual Payments April, 1934–March, 1939	Actual 1938–9
	£ mn.	£ mn
Agriculture (excl. Wheat Levy) .	8·12	9·64
Herrings	0·032	0·02
Civil Aviation	1·16	2·67
Shipping (1935–7) . . .	2·0	—
	11·31	12·33
Wheat Levy	(1934–8) 4·0	(1937–8) 2·0

This does not, however, show the whole amount of assistance which may be applied in a number of indirect ways. For instance the sugar-beet industry which received a direct £2½ millions in 1938–9 also had a revenue advantage over taxed imported sugar worth some £2½–£3 millions. The oil from coal industry paid no duty on its output and thus

cost the Exchequer some £3¾ millions. Shipping and shipbuilding were scheduled for assistance in 1939 to the extent of some £3½ millions per annum. The Wheat Levy which is paid to home growers is raised by a special tax on all flour.

Taxation or Borrowing

Should unproductive expenditure such as rearmament be financed out of taxation or by loans? It is often suggested that taxation would be too onerous if the whole cost of rearmament fell on income, but this is to forget that the whole cost of rearmament must in any case be borne currently in a productive sense and is therefore a current charge on the national income. Economically no expenditure can be passed on to posterity. When loans are raised they can only be raised out of current incomes: those same incomes could be taxed and the only reason why they are not is on account of the political opposition with which such proposals would meet. It is pleasanter to lend one's income in return for a yearly interest than to have that income taken away in taxation.

The argument is therefore raised that though the present generation, and in particular that class whose surplus income is available for war finance, must forgo present consumption, yet they should be compensated later. After the war, therefore, transfers of income in the form of interest on loans should be made from income earners to war-time lenders to enable the latter to purchase commodities they were forced to do without during the war, at the expense of the post-war generation.

The argument assumes rather naively that wars are fought for the benefit of later generations, and that all who make sacrifices will be compensated. In fact the compensation is only given to those groups whose incomes were large enough to enable them to lend. Mr. J. M. Keynes' scheme[1] of forced loans from the whole population to reduce

[1] *How to Pay for the War*. Macmillan, 1940.

war-time consumption and to increase post-war consumption has no advantages over a scheme of equitable taxation to pay for the whole of the war, coupled with direct post-war compensation to all those who had to make sacrifices, and not financial sacrifices alone, above the general minimum.

The burden of war borrowing may be seen by a comparison of the State (or national) debt at the beginning of the last war and of the present. In 1913–14 the debt was £650 millions and it cost the taxpayer £19·3 millions in interest, in 1938–9 the debt was £8166 millions and the interest charge £216·8 millions.

Local Taxation

Local taxation is, of course, raised by local governing bodies, though contributions are made to local expenditure from central taxation. In considering local burdens the same general principles apply. Local revenues are, however, sometimes assisted by trade and business carried on by the local authorities, as in tramway undertakings, gas-works, and water-works.

Every year the financial officials of the local authorities estimate their needs, and rates are imposed on the rateable value of the area. It is assumed that the annual value of the property occupied is an index of the financial strength of the occupier, but this is not always the case. Consideration of the ability to pay does not arise and great inequalities and anomalies exist. In the more heavily rated districts rates constitute a burden which it may be difficult to pass on to the consumer. As depression in a district increases, the liability due to unemployment and other causes becomes heavier. Thus the worst hit industries are subject to the greatest deterrents. The old system failed in equity.

The Local Government Act, 1929, provided for the total exemption of agricultural land and buildings from rates, and partial relief from rates in respect of industrial and freight-transport enterprises.

Briefly, the immediate consequence of the measure was

to give to industry a bonus in the aggregate of approximately £26,000,000 yearly. The relief from local rates to the engineering industry, including marine engineering, was from £2,000,000 to £2,500,000. In the case of railways the relief was antedated from December, 1928, on the understanding that it would be used mainly for the lowering of freights on export and industrial coal and agricultural produce. In 1935-36 railway assessments were substantially reduced.

Taxes Paid by a Trade or Business

We may now consider the taxes ordinarily paid by a trade or business. The taxes of an important industrial undertaking are the following—

Local Rates and Taxes (Poor and General District Rate).
Income Tax, Schedule A Assessment.
Health and Unemployment Insurance Contributions.
Income Tax, Schedule D Assessment.

The rates are fixed by the local authorities in advance of the financial year. The prevailing taxation is to be found in the Finance Act of the year. Health and unemployment insurance have been discussed in a previous chapter; the amounts of contributions are fixed by special statute.

As we have seen, Schedule A assessment is the landlord's tax. It is paid by the occupier of the premises, who, if a tenant, deducts it from the next payment of rent. Schedule D assessment is the tax on profits. More than half the revenue from income tax is said to be obtained under this heading. It should be noted that income liable to taxation is different from a statement of net profits, the difference lying in the expenses which it is allowable to deduct from gross profits.

Assessment of Business Premises

The principal assessments of business premises may be divided into real estate and machinery. The gross assessment for rating purposes is defined by the Rating and

Valuation Act, 1925, as "the rent at which an hereditament might reasonably be expected to let from year to year, if the tenant undertook to pay all usual tenant's rates and taxes, and if the landlord undertook to bear the repairs and insurance and other expenses necessary to maintain the hereditament in a state to command that rent." For the net assessment a sum representing the average annual cost of such repairs, insurance, and other expenses is deducted from the gross assessment. Within the Administrative County of London the basis of assessment for property tax (Schedule A) is the same as for rates. Outside London the basis is the "rack rent," which, although defined somewhat differently, has in practice a similar meaning to the gross assessment under the Rating and Valuation Act. The allowance for repairs, insurance, and maintenance varies from one quarter to one-eighth as the gross assessment increases. Land tax is assessed on a different basis, but is often dependent on the property tax assessment. The annual value of property, if not the rent actually paid by a tenant, is estimated as the highest rent which could be obtained for it by any person who is willing to become the tenant. If occupied by the owners, and there is no comparable property, a hypothetical rental value must be calculated. The special experience of valuers skilled in this kind of work is, of course, necessary, but an equitable method is to take the value of the land and buildings and calculate a reasonable annual return on the investment of this capital sum. Special difficulties arise if the factory is only suitable for one specialized trade, as the prospective rent might be much lowered. In times of acute industrial depression appeals are made for reductions in the annual value for the purposes of the poor rate, and reductions are frequently granted. It does not follow that in such cases the annual value for Schedule A will also be reduced. The Income Tax Commissioners may, however, make an order appointing a valuer to inspect the property and to report to them thereon.

Assessment of Machinery

The allowance for depreciation by wear and tear of machinery is the only exception to the general rule of granting no allowance, in assessing income tax, for the wastage of assets in the course of trade. In this special case, the allowance may not exceed the actual cost of the machinery plus subsequent improvements, less residual value, and is usually estimated as a percentage of the diminishing value. When obsolete machinery is replaced, an allowance is made for the difference between its selling value and the portion of its cost price not covered by depreciation allowances The importance of this subject in allowing industry to keep up to date by introducing modern machinery needs no emphasis Special attention is given to it in the United States, where the Government adopts the policy of assisting progressive manufacturers.

For determining the assessment of machinery the Rating and Valuation Act, 1925, now applies, and the same basis will be adhered to for property tax assessment. It effected some long-needed improvements and afforded a measure of relief to industry. In the case of business premises other than those expressly excluded, such as railway, gas, water, electricity, and tramway undertakings, the plant and machinery set out in the Third Schedule of the Act are to be valued for rating purposes. The specified plant and machinery are divided into the four following classes—

1. That used or intended for (*a*) the generation, storage, primary transformation or main transmission of power in or on the hereditament; (*b*) the heating, cooling, ventilating, lighting, draining, or supplying of water to the land or buildings of which the hereditament consists, or the protecting of the hereditament from fire.

2. Lifts mainly used for passengers.

3. Railway and tramway lines and tracks.

4. Such parts of plant and machinery as are in the nature of a building or structure, including blast furnaces,

gas holders, coke ovens, cupolas, water towers, and tar-distilling plants.

All other items of machinery and plant are exempt A committee was appointed by the Minister of Health to prepare a statement setting out in detail all machinery and plant considered to fall within the classes 1 to 4 above. This schedule is set out in the Plant and Machinery (Valuation for Rating) Order, 1927. It should be borne in mind that plant of the nature covered by the schedule, which is mainly used in connection with trade processes or secondary transformation, cannot be properly deemed a part of the hereditament. Thus, plant which is used for the purpose of, and in connection with, manufacturing processes for heating, ventilating, lighting, and protection from fire is not rendered rateable. The Act directs Rating Authorities, who are now the Councils of Boroughs, Urban and Rural Districts, to bring in a new valuation list quinquennially. A professional valuer is usually appointed to deal with the more important manufacturing premises.

It will be seen that the net annual value for rating purposes represents the utility value of the land, buildings, and plant. Consideration must be given to the ability of machinery to fulfil its functions economically, the suitability of the site and the suitability of the buildings. These and the prospects of the near future would greatly affect the mind of a hypothetical tenant who knew his business in determining the rent which he would pay.

FURTHER READING

The Principles of Taxation · Lord Stamp. (Macmillan.)
National Income and Outlay Colin Clark. (Macmillan.)
Snelling's Practical Income Tax and Sur-Tax C. W. Chivers. (Pitman)
Rates and Rating · Crew and Jones. (Pitman.)

CHAPTER XVI

INSURANCE

The term insurance is applied to those risks which are contingent in their nature, such as fire, accident, and marine losses. Assurance has reference to events which are certain to happen, and is almost exclusively applied to life risks.

Insurance is a system of distributing the losses from unforeseen happenings. It does not actually avoid loss, for under the law of averages losses are bound to be sustained, but to whom they will occur is not determinable. Insurance spreads the loss and protects the individuals from disaster. No business man can afford to neglect its advantages and safeguards. The contribution of insurance premiums constitutes a common fund from which losses are paid. The underwriters or companies collect from all, and compensate the unfortunate minority. The fact of insurance encourages the use of safeguards, and fosters research in methods of waste prevention.

The cost of insurance depends, of course, to some extent, on the probability of the contingency insured against happening. Insurance is at the very root of modern business, for commerce is founded on credit and credit is founded on commerce. The fortunes of merchants are exposed to perils of the sea, or consist of stocks of goods which may be destroyed by fire. Without insurance these merchants could not look to the banks to finance their trade. Factories and their contents may be destroyed by fire in a few hours. How many investors would entrust their money to manufacturers if the latter could not insure against this contingency? Without insurance many traders would be faced by ruin through some accident beyond their control. If the success of a business depended on the life of an

individual, investments in that business would be difficult to obtain if his life could not be insured.

Contracts of Indemnity

Insurance may be defined as a contract to secure payment against a loss which may arise on the happening of some event, that is, to place the insured in the same position as he was before the loss. An insurance policy is the document embodying the contract between insurer and insured. Under such a contract a person or company agrees, in consideration of receiving a series of payments called premiums, to pay a larger sum if a certain event happens. Without consideration no contract arises. The intention is to compensate the insured person for any damage suffered owing to the occurrence of the event insured against. It results in practice in an arrangement by which a loss, instead of being borne by one person, is spread over a large number. Insurance enables a man to protect himself from loss from events beyond his control, and thus gives security in trade and is to the public benefit. It should be distinguished from wagers or agreements based on speculation, which are unenforceable, though in practice great difficulty is sometimes found in drawing this distinction.

Contracts of insurance are *uberrimae fidei*, that is, must be made in the utmost good faith, and every material fact must be disclosed to the insurer. Misrepresentation will render the policy void.

A person cannot take out a valid policy of insurance unless he has an "insurable," which ordinarily means pecuniary, interest in the subject-matter. In other words, if the party is insuring against the happening of an event, he must be in such a position that if the event does happen he will suffer a loss; if the event does not happen, he will, of course, remain in *status quo*. A contract of insurance cannot be transferred except with the consent of the insurers.

Almost any risk to which man is liable may be insured

against, e.g. burglary risk, personal accident, disease and sickness, infidelity of employees, commercial credit risks, loss of rent, loss of profit, cash in transit, contingency insurance, and so on, but the three most common varieties are life, fire, and marine insurance.

There is an important principle in connection with insurance, called subrogation, arising out of the fact that insurance is a contract to indemnify. This doctrine is to the effect that when the insurance company has paid to the insured the amount of the loss, it immediately becomes entitled to all rights of action against third parties and to recover from him anything he may have received as compensation from others.

Life Assurance

Life assurance attained an early popularity. Its main object is to secure to those who are dependent on the assured payment of a sum of money at his death. With an endowment policy the payment is either at death of the assured or at a fixed date. A creditor has an insurable interest in the life of his debtor to the amount of the debt, and a servant engaged at a definite salary for a number of years has an interest in the life of his employer to the extent of the unexpired portion of his service. To a business man a life assurance policy is very useful. It may be used as security for money advanced to the assured. The terms of a partnership agreement often provide that on the death of a partner the capital he has put into a business shall be paid out in full immediately. This may prove very inconvenient to the survivors, and it is usual to effect a joint life assurance payable on the occurrence of the first death. There are, of course, a number of difficulties which may arise, but the insurance companies are prepared to devise equitable arrangements. A life assurance policy may be taken out by a banker who has made advances to a borrower against securities which may prove of no value if the latter dies before the loan is repaid,

FIRE INSURANCE

Fire insurance is a contract by which the insurance company undertakes to indemnify the insured against a fire happening within an agreed period. The insured person must be in a position that he incurs loss should the burning occur. As applied to fire insurance, the principle of indemnity implies that the insured cannot recover from the insurer any sum greater than that which represents the actual loss sustained The premiums required to insure a particular building or contents depend on the probability of fire, into which many factors enter, such as the situation, the materials of construction, the condition of electric wiring, the nature of the business, and the use of approved preventive appliances, e.g. alarms, sprinklers, chemical extinguishers, and fireproof doors It is interesting to note that fire brigades were due originally to the existence of insurance offices Fire insurance led to the study of methods of construction tending to minimize risks, and in this and other ways has tended to reduce the losses experienced.

As regards the practical aspect of insurance, there is no difficulty, nowadays, in getting in touch with an insurance broker or an insurance company. Of the latter the mutual form of organization tends to increase, the insured paying the premiums and also sharing in the profits. The first thing to do in taking out a policy is to complete a proposal form, giving the various particulars asked for. In the case of fire insurance, for example, details of the building or other property to be insured must be included. The contract itself is not completed until the first premium has been remitted. Usually, before accepting a fire insurance risk, the company has the premises inspected by its surveyor. He then determines what discount, if any, can be allowed for special types of construction, the provision of fire-extinguishing appliances or superior heating arrangements. The policy enumerates the conditions under which it is issued, and may place certain

restrictions on the insured person. The amount of insurance may offer some difficulty, as the book value of buildings, plant, etc., shown in the balance sheet, may mean nothing. A careful computation of the risk is essential.

It is safest to take the insurable value as the cost of replacement, or the market value. Separate policies should be taken out on buildings and fixtures, machinery and accessories, stock and materials, patterns, and so on. When insuring stock a floating policy is sometimes taken out to cover loss in any or all of the places where it may be stored If the total value at risk exceeds the sum insured, the condition of average comes into force. This means that the insured can only recover a proportion of the loss, viz. the ratio of the amount insured to the total value at the time of the loss. It should be noted that in the case of fire, expenses incurred in protecting the property from further damage become a proper charge additional to the loss.

British fire insurance has grown to enormous proportions, including a great deal of foreign business, which indicates the importance attaching to British credit.

Machinery Insurance

Engineering insurance is usually considered to refer to insurance covering hazards to mechanical structures used in the generation of power, and dates back to the middle of the nineteenth century. The premium covers loss or damage, including injuries, repairs or replacements, and periodic inspection and reports by engineer surveyors. Its advantages are that it minimizes sudden and unexpected breakdowns, inefficiency in the operation of machinery, heavy claims, and the inconvenience of financial loss. It is transacted by most of the composite insurance companies, which have set up special engineering departments or have continued one or other of the specialist insurance companies which they have acquired. Every class of boiler, steam or electric generator, and machinery driven thereby, may be

insured against breakdown. Steam boiler insurance is taken out with a view to being indemnified against damage to boilers and other property caused by explosion, and resulting damage to persons. Legal enactments relating to boiler insurance are to be found in the Boiler Explosions Acts, 1882 and 1890, the Factory Act, 1901, the Coal Mines Act, 1911, and Dock Regulations, 1925. There are certain occurrences for which the insurance company may not be held responsible, as, for example, collapse of supporting structures, but the terms are clearly set forth in the policy. Boilers are inspected periodically by the company's engineers, and their requirements must be carried out. Safe boiler pressures are also stated. The same form of protection may be obtained against damage from the bursting of fly-wheels. When these are insured, safe maximum speeds are laid down.

Reference may be made to the Manchester Steam Users' Association, which was established by Houldsworth, Fairbairn and Whitworth in 1854. Its objects are the prevention of steam boiler explosions and the attainment of economy in the application of steam. An interesting memorandum is published yearly by the chief engineer. There are a number of companies engaged in this type of insurance, of which the following may be referred to as illustrations. The British Engine Boiler and Electrical Insurance Co., Ltd., undertakes the insurance of motors and vessels under pressure against explosion and collapse, also against damage due to leakage of heating installations Other plant which may be covered includes items like piping, radiators, and so on The insured may be indemnified against time loss, due to the happening of the events insured against.

The National Boiler and General Insurance Company, formed in 1864, undertakes the inspection and insurance of steam boilers, steam vessels, economizers, feed water heaters, steam pipes, steam engines and turbines, gas and oil engines, dynamos, electric motors, etc. Lifts and hoists

inspection is also carried out. The chief engineer of the company has issued an interesting booklet on the working of steam boilers. The Vulcan Boiler and General Insurance Co., Ltd., founded in 1859, also insures boilers, engines, electrical machines and lifts, power gas plants, and so on. The necessity for adequate insurance of the type under consideration is illustrated by the fact that one steam engine in ten is said to break down every year. Each insurance company employs a staff of engineers, who give advice to the insured on all engineering questions, one of the many advantages such companies offer.

Policies are usually taken out separately for (1) boilers, (2) engines, (3) lifts, hoists and cranes, (4) electrical nachinery. The proposal forms must be carefully studied, particularly as regards conditions and exceptions. If the nsured wishes to cover parts of machinery or contingencies iot included in the policy, these can usually be added as ndorsements on payment of additional premiums. Certain isks are, however, considered undesirable by the insurance ompanies, such as electrical plants in chemical works, olling mill engines and so on. The rating or assessment or premiums depends, of course, on the machinery under onsideration, such as evaporative capacity for water-tube oilers and diameter of cylinder, number of cylinders id revolutions per minute for engines. Reference should e made to the Reports of the Chief Factory Inspector, hich analyse breakdowns in machinery during the past ear.

SURANCE AGAINST CONSEQUENTIAL LOSS—COMMERCIAL VEHICLE AND ACCIDENT INSURANCE

If property is destroyed by fire or otherwise, the loss volved is not only a material one, but includes loss of rent d loss of profit owing to the owner being unable to occupy factory or utilize his stores or stock of finished goods. ere may be, in fact, a serious loss from interruption of siness. This consequential loss may be insured against,

though it presents some difficulties; for example, if books have to be examined to determine profit, the settlement may be long drawn out. Usually it is agreed to pay a percentage of the shortage in turnover compared with the previous year's figures. Loss of profit and standing charges, which continue even when work ceases altogether, are generally insured against together. Loss of rent, sustained by either a tenant or a landlord, may also be insured against, though subject to special clauses.

As most manufacturing firms have a number of commercial vehicles for distribution of their products, motor-car insurance must not be overlooked. It is customary to take out all-in or universal policies, covering theft, third party, and all other risks.

Accident insurance, including workmen's compensation, has been considered in a previous chapter dealing with legislation affecting factory owners. It may be mentioned that in the United States and France industrial group insurance has been developed to a considerable extent. In the former country it is said to protect over five million employees. It is claimed to improve industrial relations and lessen labour turnover.

Marine Insurance

Marine insurance, which is intimately bound up with trade and commerce, is the oldest form of insurance, and covers the special risks of sea transport which, as is well known, are greater than the corresponding risks of land transport. Examination of a bill of lading, for example, shows a large number of risks for which the shipowners disclaim liability. There has thus been a special class of business in which responsibility for risks incidental to the transport of goods by sea, whether in transit and in the warehouse is assumed in return for payment of a consideration or premium. The premium depends on the class of goods, the packing, journey, vessel and port facilities. In a contract of marine insurance the insurer agrees to

compensate the owner of a ship or cargo for complete or partial loss at sea, or, in more legal language, it is a contract for indemnity against loss accruing to ship, cargo, freight, etc., during a voyage or voyages. Any person interested in a marine adventure has an insurable interest therein Obviously the contract is one requiring the utmost good faith, and every circumstance material to the risk must be disclosed to the insurer.

Marine insurance has become technical and complicated. The risks involved are very numerous and depend on the technicalities of navigation. Obviously it is a highly specialized subject, which can only be referred to here in the barest outline. The employment of an insurance broker or an agent of an insurance company is general, as a highly specialized knowledge of market conditions, rulings, and rates makes the business of marine insurance contracts a matter for experts. The law relating to marine insurance is codified in the Marine Insurance Act, 1906.

Lloyd's

Lloyd's is an association of underwriters or persons engaged in insurance Whilst the underwriters at first confined their activities to marine insurance, they now undertake every class except that of life assurance. Lloyd's was originally a coffee house dating back to 1688, when merchants used to meet at Edward Lloyd's in Tower Street. This corporation now has offices in Leadenhall Street, its objects being defined in the Act of Incorporation, 1871, including the carrying on of insurance by its members, not only marine but every class except life assurance, the protection of the interests of its members, and the collection, publication, and diffusion of information on shipping. It has agents in nearly all ports, who collect information with regard to shipping and supply it to the central establishment for publication. All insurances at Lloyd's are effected by brokers, who receive their remuneration from a reduction on the premiums. The broker writes on a "slip"

the particulars of the insurance he desires to effect The usual contents of the slip are goods and value, name of ship, ports of loading and discharge, and special arrangements. The broker having arranged the prices per cent, the underwriter notes on the slip the share of the insurance he will take up

Lloyd's as such does not carry on the business of marine insurance except through its individual members; that is, each individual is in the nature of a separate organization. In other words, one can insure at Lloyd's but not with Lloyd's. The slip is the basis of the contract of marine insurance, the general commercial practice being to recognize a memorandum of the terms initialed by the underwriter as though it were the contract, but the policy must be duly executed.

Another document which must be noted is the cover note, which holds the owners covered till the insurance policy is issued.

Insurance policies may be valued or unvalued, that is, the value is fixed and stated in the policy, or not stated, and remains a matter of assessment Policies may also be divided into voyage, time, and mixed.

A Lloyd's S.G. marine insurance policy should be carefully studied. As the context of the policy dates back to 1779, the style and language are antiquated. On the other hand, the various phrases and clauses have by mercantile custom and legal interpretation come to possess exact meanings and effects. On account of changed conditions many additional clauses are attached to the policy according to the terms of the insurance.

A clause at the foot of the policy is known as the memorandum. It prevents the insurers being liable on certain goods particularly subject to damage on a sea voyage. In certain other classes of goods the underwriter is free of liability, unless the damage exceeds a stated percentage It should be noted that a Lloyd's policy is not a joint and several risk.

Average

Two other highly technical matters relating to marine insurance may be mentioned, viz. particular and general average. A particular average loss is a partial loss caused by maritime perils insured against, and which is not a general average loss. The loss remains where it falls, that is, on the owner of the damaged part. A claim, therefore, arises in respect of the damage sustained; in fact, the great majority of claims come under particular average. In nearly all cases claims are settled by a skilled average adjuster. No claim can be made on certain goods unless for an amount over 3 per cent, on others 5 per cent, and on others no claim at all can be made. The measure of a partial average loss is the difference between the amount realized by the goods (say) in their damaged condition and the sum they would have realized if they had arrived sound.

General average is all losses or expenses which arise when the cargo or part of the ship is sacrificed for the general good. It is usually an intentional loss to avoid danger or preserve the ship and cargo. General average loss is borne proportionally by all interested. General average claims are usually mixed up with particular average.

Marine Insurance Policies

In marine insurance the business man is most particularly concerned with cargo risks. It is not usually necessary or desirable to take out a separate insurance for every transaction; it is preferable for continuous trading to have permanent cover, i.e. insurance up to a stated amount, for all sendings while the cover remains open. Such open cover is not an approved contract of insurance, but policies are issued incorporating by reference the terms and conditions thereof. Sometimes a limit per shipment is agreed upon. The shipper should bear in mind the great importance of the valuation of the materials insured. Valued policies are almost invariably the rule. The value should be taken as the full value, including profit. In the carriage of

goods by sea certain responsibilities must be assumed by the carrier. These are set out and defined in the Carriage of Goods by Sea Act, 1924. In the case of loss, however, the cargo owner usually claims under the marine insurance policy, and settlement, if necessary, with the shipowners occurs later, the insured's remedies against the carrier being subrogated to the insurers. Notice of loss or damage must, of course, be given by the insured within the period laid down by statute.

In making a claim notice is given to the underwriter's agent at once, who gives a certificate indicating the extent of the damage. The insured then sends the agent's certificate, survey particulars, the insurance policy, copy of the invoice, and the captain's protest to the insurers. The latter are only liable for the ratio of the damaged to the sound value.

Insurance Companies

Marine insurance policies may be taken out with a marine insurance company, and insurance may be effected without the intervention of a broker but through the agent of the company. An insurance company is a large body liable for whatever it undertakes, but it often hedges by reinsuring part of the risk. Reinsurance and double insurance have come into use owing to the magnitude of modern marine adventures. Some shipping companies are their own insurers. This is not, of course, the only example of private insurance with the object of saving or reducing the insurance premiums. The fund accumulated for this purpose must be invested in readily realizable securities. Few businesses can, however, carry the burden of accumulating a fund and paying premiums to keep themselves covered in the meantime. It is doubtful, for example, if it is a commercial proposition for an employer to carry his own risks under the Workmen's Compensation Act.

Companies may be divided into two classes, Tariff and Non-tariff, though this does not apply to life and marine insurance. Most of the companies belong, however, to the

Fire Offices Committee and the Accident Offices Association. These Tariff Associations fix the insurance rates based on their combined experience. The control of insurance by the Government is by means of the Insurance Companies Acts, which provide that the annual accounts of the insurance companies must be presented in a prescribed form and accompanied by various returns.

Insurance companies may be either mutual, i.e. the insured are the shareholders, and the profits are distributed between them as bonuses or reduced premiums, or proprietary, i.e. the capital is subscribed by shareholders and the policy holders have no interest except settlement of claims.

NOTES

B/L . . Bill of Lading A statement of goods shipped, signed by the agent of the owner or the master of the ship, acknowledging receipt and promising to deliver safely at the place directed, dangers of the sea excepted.

F.P A. . . Free from particular average.

W.P.A. . With particular average or all risks insured.

F.O.B. . . Free on board (goods are at purchaser's risk)

C.i.f . . Cost insurance, freight (goods are at exporter's risk).

FURTHER READING

Industrial Assurance Organization and Routine. R. Dinnage and T. Hills. (Pitman.)

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